INSTITUTE OF GRADUATE PROGRAMS

The Graduate School of Sciences at Anadolu University was first established in 1982, but when this school became a part of the newly established Osmangazi University, the graduate school was re-founded in 1993. The main purpose of the graduate school is to offer MSc and PhD education at international standards and encourage students to carry out advanced research.

Director	: Prof.Dr. Murat TANIŞLI
Deputy Director	: Dr. Lecturer Hüseyin Ersin EROL
Deputy Director	: Assoc. Prof.Dr. Tuğba ARAS
Secretary of Institute	: Demet BAYRAKTAR

STAFF

Associate Professors:
Tuğba ARAS

Faculty Members:
İlker DEMİROĞLU

Research Assistants:
Ahmet Murat TÜRK

Elective Courses

FBE601	Design, Science and Communication	3+0	7.5
LEE501	Open and Distance Education	3+0	7.5
LEE503	Design of Online Learning Environments	2+1	5.0
LEE504	Virtual Relity And Metaverse	3+0	7.5
LEE505	Digital Culture And Communication	3+0	7.5
LEE507	Academic Writing	3+0	7.5
LEE601 (Eng)	Technical English	3+0	3.0
LEE603	Learning and Teaching in Higher Education	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5

DEPARTMENT OF PHYSICAL EDUCATION AND SPORTS

Head : Assoc. Prof.Dr. Deniz ŞİMŞEK

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester					**II.Semester**		
Seçmeli Dersler	- -	30.0	BES692		Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
		-----					-----
		30.0					30.0

III.Semester					**IV.Semester**		
DYS000	Qualifying Exam	0+0	0.0	BES890-0	Thesis (Thesis Proposal)	0+1	30.0

			---				-----
			--				
							30.0

	V.Semester				VI.Semester		
BES890	Thesis	0+1	30.0	BES890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

	VII.Semester				VIII.Semester		
BES890	Thesis	0+1	30.0	BES890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

BES601	Teaching Methodology in Physical Education and Sports	3+0	7.5
BES607	Sports for the Disabled	3+0	7.5
BES616	Medical Subjects in Sports and Health Organizations for Athletes	3+0	7.5
BES626	Contemporary Approaches in Sport and Exercise Psychology	3+0	7.5
BES627	Social Psychology of Sport	3+0	7.5
BES628	Arousal Theories in Sport	3+0	7.5
BES629	Research Methods and Techniques in Sports	3+0	7.5
BES631	Instructional Models for Physical Education	3+0	7.5
BES636	Pedobarographic Applications During Various Motor Tasks	2+1	7.5
BES648	Assessment of Reaction Analyses with Neuro-Physiological and Physiological Variables	2+1	7.5
BES652	Physical Fitness in lndividuals with Special Needs	3+0	7.5
BES654	Fundamentals of Electroencephalography (EEG) and Signal Processing Methods	2+1	7.5
BES655	Use of Eye Tracking Technology in Different Sports Branches	3+0	7.5
BES657	Physical Education and Sports far lndividuals with Special Needs	3+0	7.5
BES661	Motivational Orientations in Sport	3+0	7.5
BES663	Program Development Models in Physical Education	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
İST632	Statistics II	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UBE901	Research in Area of Specialization	5+0	7.5
UEB902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

	I.Semester				II.Semester		
BES533	Introduction to Research Methods and Technics in Sports	3+0	7.5	BES592	Seminar	3+0	7.5
İST543	Statistics I	3+0	7.5	EDB501	Academic Writing Skills	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----
			30.0				30.0

	III.Semester				IV.Semester		
BES790	Thesis	0+1	30.0	BES790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

BES504	Sport Medicine	3+0	7.5
BES505	Protection Sport Accidents and Treatment Approaches	3+0	7.5
BES508	Exercise Physiology	3+0	7.5
BES517	Sport Physiology	3+0	7.5
BES526	Motivational Orientations in Sport	3+0	7.5
BES528	Planning and Evaluation in Physical Education Teaching	3+0	7.5
BES530	Antioxidants and Athletics Performance	3+0	7.5
BES531	Exercise and Sport Psychology	3+0	7.5
BES536	Evaluation of Physical and Motor Fitness in School	2+1	7.5
BES538	Laboratory Experiences in Functional Evaluation of Skeletal Muscle	2+1	7.5
BES539	Motor Control of Human Movement	3+0	7.5
BES540	Physical Activity and Health in Schools	3+0	7.5
BES541	Comparative Physical Education	3+0	7.5
BES544	Recreation Programs in Schools	3+0	7.5
BES546	Recreation and Sport Practices for the People with Disabilities	3+0	7.5
BES562	Evaluation of Physical Fitness in lndividuals with Special Needs	3+0	7.5
BES563	Health and Exercise	3+0	7.5
BES564	Adapted Physical Education and Sport	3+0	7.5
BES568	New Approaches and Models in Physical Education and Sports	3+0	7.5
BES570	Academic Writing in Social Sciences: Movement Education, Physical Activity and Sedentary Behaviour	3+0	7.5
BES571	Model Based Physical Education Teaching	3+0	7.5
BES572	Sedentary Behaviour Epidemiology	3+0	7.5
BES573	Psychology for Physical Education and Sport	3+0	7.5
BES574	Human at Extreme	3+0	7.5
BES575	Basic Strategies and Design in the Preparation of Physical Education Programs	3+0	7.5
BES576	Sport and Ergonomics	3+0	7.5
BES577	Theoretical Foundations of Program Development in Physical Education	3+0	7.5
BES578	Upper and Lower Extremity Sports Injuries	3+0	7.5
BES579	Physical Activity and Population Health	3+0	7.5
BES581	Scientific Aproaches In Movement and Sport Education	1+2	7.5
BES583	Social Determinants of Physical Activity	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UEB701	Research in Area of Specialization	3+0	4.5
UEB702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF COMPUTER ENGINEERING

Head : Prof.Dr. Serkan GÜNAL

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester					II.Semester		
Seçmeli Dersler	- -	30.0	BİL692		Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
		-----					-----
		30.0					30.0

III.Semester					IV.Semester		
DYS000	Qualifying Exam	0+0	0.0	BİM890-0	Thesis (Thesis Proposal)	0+1	30.0

			---				-----
			--				
							30.0

	V.Semester				**VI.Semester**		
BİM890	Thesis	0+1	30.0	BİM890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

	VII.Semester				**VIII.Semester**		
BİM890	Thesis	0+1	30.0	BİM890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

BİL604	Information Technology Management	3+0	7.5
BİL605	Distributed Computing Methods	3+0	7.5
BİL606	Natural Language Processing	3+0	7.5
BİL607	Advanced Information Retrieval Systems	3+0	7.5
BİL612	Data and Text Mining	3+0	7.5
BİL613	Machine Learning	3+0	7.5
BİL615	Special Topics in Information Technologies	3+0	7.5
BİL616	Pattern Recognition Applications	3+0	7.5
BİL617	Cryptology	3+0	7.5
BİL619	Advanced Discrete Mathematics	3+0	7.5
BİL620	Multi Agent Systems	3+0	7.5
BİL621	Text Analytics	3+0	7.5
BİL623	Advanced Engineering Mathematics	3+0	7.5
BİL624	Deep Learning Theory and Applications	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UBM901	Research in Area of Specialization	5+0	7.5
UBM902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

	I.Semester				**II.Semester**		
BİL519	Advanced Algorithm Analysis	3+0	7.5	BİL551	Advanced Database Management Systems	3+0	7.5
	Seçmeli Dersler	--	22.5	BİL553	Object Oriented Systems	3+0	7.5
				BİL591	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

	III.Semester				**IV.Semester**		
BİM790	Thesis	0+1	30.0	BİM790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

BİL532	Computer Vision	3+0	7.5
BİL533	Data Science	3+0	7.5
BİL534	Digital Image Processing	3+0	7.5
BİL535	Artificial Intelligence in Healthcare	3+0	7.5
BİL552	Programming Languages	3+0	7.5
BİL554	Operating Systems	3+0	7.5
BİL555	Advanced Computer Networks	3+0	7.5
BİL556	Computer Graphics	3+0	7.5
BİL557	Internet Software	3+0	7.5
BİL558	Parallel Programming	3+0	7.5
BİL559	Software Engineering	3+0	7.5
BİL561	Fuzzy Neural Networks	3+0	7.5
BİL562	Network Security	3+0	7.5
BİL563	Fuzzy Logic	3+0	7.5
BİL564	Data Acquisition and Mining	3+0	7.5
BİL565	Rough Sets Theory	3+0	7.5
BİL566	Pattern Analysis	3+0	7.5
BİL567	Introduction to Recommender Systems	3+0	7.5
BİL569	Big Data Systems	3+0	7.5
BİL571	Advanced Neural Network Models	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UBM701	Research in Area of Specialization	3+0	4.5
UBM702	Research in Area of Specialization	3+0	4.5

PROGRAM IN INFORMATICS

PROGRAM

	I.Semester				II.Semester		
BİL505	Data Systems: Analysis and Design	3+0	7.5	BİL528	Computer Programming II	3+0	7.5
BİL527	Computer Programming I	3+0	7.5	BİL592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

	III.Semester				IV.Semester		
BİL790	Thesis	0+1	30.0	BİL790	Thesis	0+1	30.0
			---				---
			30.0				30.0

(NON-THESIS) MASTER OF SCIENCE (MS) DEGREE

PROGRAM IN INFORMATICS

PROGRAM

I.Semester	II.Semester

BİL505	Data Systems: Analysis and Design	3+0	7.5	BİL528	Computer Programming II	3+0	7.5
BİL527	Computer Programming I	3+0	7.5	BİL599	Term Project	3+0	0.0
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	22.5
			-----				-----
			30.0				30.0

Elective Courses

BİL503	Object Oriented Programming	3+0	7.5
BİL504	Data Structure and Algorithms	3+0	7.5
BİL506	Database Management Systems	3+0	7.5
BİL507	Introduction to Operating Systems	3+0	7.5
BİL509	Simulation and Modeling	3+0	7.5
BİL510	Artifical Intelligence	3+0	7.5
BİL511	Computer Aided Design	3+0	7.5
BİL513	Numerical Analysis	3+0	7.5
BİL514	Decision Support Systems	3+0	7.5
BİL517	Logic Design	3+0	7.5
BİL518	Microprocessors	3+0	7.5
BİL520	Advanced Communication Technology	3+0	7.5
BİL521	Management Information Systems	3+0	7.5
BİL522	Computer Organization	3+0	7.5
BİL523	Computer Networks	3+0	7.5
BİL525	Fast Application Development	3+0	7.5
BİL532	Computer Vision	3+0	7.5
BİL533	Data Science	3+0	7.5
BİL534	Digital Image Processing	3+0	7.5
BİL535	Artificial Intelligence in Healthcare	3+0	7.5
BİL560	Data Access Systems	3+0	7.5

DEPARTMENT OF BIOLOGY

Head : Prof.Dr. Berrin TÜYLÜ

DOCTORATE DEGREE (PH.D)

PROGRAM

	I.Semester				**II.Semester**		
	Seçmeli Dersler	- -	30.0	BİY692	Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
			-----				-----
			30.0				30.0

	III.Semester				**IV.Semester**		
DYS000	Qualifying Exam	0+0	0.0	BİY890-0	Thesis (Thesis Proposal)	0+1	30.0
			--- --				-----
							30.0

	V.Semester				**VI.Semester**		
BİY890	Thesis	0+1	30.0	BİY890	Thesis	0+1	30.0

			-----				-----
			30.0				30.0
	VII.Semester				**VIII.Semester**		
BİY890	Thesis	0+1	30.0	BİY890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

BİY601	Microbial Laboratory Techniques	3+0	7.5
BİY602	Water Microbiology	3+0	7.5
BİY603	Environmental Pollution and Plants	3+0	7.5
BİY604	Recombinant DNA Technology	3+0	7.5
BİY605	Animal Tissue Culture	3+0	7.5
BİY606	Yeast Science	3+0	7.5
BİY607	Oceanology	3+0	7.5
BİY608	Advanced Endocrinology	3+0	7.5
BİY609	Parasite Plants	3+0	7.5
BİY611	Genomics	3+0	7.5
BİY612	Microbial Physiology	3+0	7.5
BİY613	Modern Mycology	3+0	7.5
BİY614	Basic Bioinformatics	3+0	7.5
BİY616	Biogeography	3+0	7.5
BİY617	Celluar Signal TransductionPathways	3+0	7.5
BİY618	Fhlyogenetic Systematics	3+0	7.5
BİY620	Forest Vegetation of Turkey	3+0	7.5
BİY621	Advanced Molecular Genetics	3+0	7.5
BİY622	Soil Biology	3+0	7.5
BİY624	Use of Bioindicators in Environment	3+0	7.5
BİY625	Special Microscopic Techniques	3+0	7.5
BİY626	Enviromental Microbiology	3+0	7.5
BİY627	Ecophysiology	3+0	7.5
BİY628	Genetic Regulation of Development	3+0	7.5
BİY629	Molecular Taxonomy	3+0	7.5
BİY630	Modern Methods in Plant Taxonomy	3+0	7.5
BİY631	Ecological Economics	3+0	7.5
BİY632	Biochemistry of Cancerogens and Mutanges	3+0	7.5
BİY633	Economic Botany	3+0	7.5
BİY634	Evolution of Microbial Pathogens	3+0	7.5
BİY635	Characteristic Behaviour of Animal Groups	3+0	7.5
BİY636	Biochemistry of Free Radicals	3+0	7.5
BİY637	Aquatic Entomology	3+0	7.5
BİY638	Archaebacteria	3+0	7.5
BİY640	Basic Virology	3+0	7.5
BİY641	Soil Science	3+0	7.5
BİY642	Protein and Nucleic Acid Analysis Techniques	3+0	7.5
BİY644	Intracellular Traffic	3+0	7.5
BİY645	Biochemistry of Nucleic Acids	3+0	7.5
BİY646	Eutrophication in Lakes	3+0	7.5
BİY647	Human Biochemistry	3+0	7.5
BİY648	Applied Mycology and Biotechnology	3+0	7.5
BİY649	Plant Genetic Resources	3+0	7.5
BİY651	Vegetation Research Methods	3+0	7.5
BİY652	Microbiyal Genomics	3+0	7.5
BİY653	Advanced Molecular Biology	3+0	7.5
BİY654	Ecological Genetics	3+0	7.5
BİY655	Natural Antimicrobial Agents and Food	3+0	7.5
BİY656	Chemotaxonomy	3+0	7.5
BİY657	Food, Human Health and Probiotics	3+0	7.5
BİY658	Cell Regulation	3+0	7.5
BİY659	Cancer Genetics	3+0	7.5

BİY660	Medical Genetics	3+0	7.5
BİY661	The Molecular Basis of Cell Differentation	3+0	7.5
BİY662	Basis of Molecular Evolution	3+0	7.5
BİY663	Araneology	3+0	7.5
BİY664	Ecological Restoration	3+0	7.5
BİY665	Advanced Biochemistry and Biochemical Techniques I	3+0	7.5
BİY666	Advanced Biochemistry and Biochemical Techniques II	3+0	7.5
BİY667	Actinomycetes in Biotechnology	3+0	7.5
BİY668	Advanced Protein Biochemistry	3+0	7.5
BİY669	Biology of Lichenicolous Fungi	3+0	7.5
BİY671	Statistical Analyses in Biology	3+0	7.5
BİY672	Advanced Biochemistry and Bioenergetics	3+0	7.5
BİY673	Molecular Industrial Biotechnology	3+0	7.5
BİY674	Molecular Microbial Ecology Techniques	3+0	7.5
BİY675	Microbial Biofilms	3+0	7.5
BİY676	Comparative Animal Physiology	3+0	7.5
BİY677	Fungal Systematic	3+0	7.5
BİY678	Significance of Plant Secondary Metabolites in Biotechnology	3+0	7.5
BİY679	Food Mycology	3+0	7.5
BİY681	Enzyme Analyses and Activity Detection Methods	3+0	7.5
BİY683	Advanced Cell Invertigation Methods	3+0	7.5
BİY684 (Eng)	Fundamentals of Epigenetics	3+0	7.5
BİY685 (Eng)	Environmental Physiology of Animals	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UBJ901	Research in Area of Specialization	5+0	7.5
UBJ902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM IN BOTANY

PROGRAM

	I.Semester				II.Semester		
BİY510	Flora of Turkey	3+0	7.5	BİY502	Methods of Plant Identification	3+0	7.5
BİY550	Molecular Techniques in Systematics	3+0	7.5	BİY592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----
			30.0				30.0

	III.Semester				IV.Semester		
BİY790	Thesis	0+1	30.0	BİY790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

BİY501	Herbarium Techniques	3+0	7.5
BİY506	Enzymatic Regulation	3+0	7.5
BİY507	Biology of Lichens	3+0	7.5
BİY509	Special Histology	3+0	7.5

BİY511	Gene Regulation	3+0	7.5
BİY512	Principles of Zoological Nomenclature	3+0	7.5
BİY514	The Harmful Insects	3+0	7.5
BİY515	Forest Ecology	3+0	7.5
BİY516	Bioenergetics	3+0	7.5
BİY517	Water Pollution and Biological Effect	3+0	7.5
BİY518	Signal Transduction in The Cell	3+0	7.5
BİY519	Limnology	3+0	7.5
BİY520	Bacterial Plant Diseases	3+0	7.5
BİY521	Biophotography	3+0	7.5
BİY522	Investigation Methods of Ecosystems	3+0	7.5
BİY524	Fishery Biology and Population Dynamics	3+0	7.5
BİY525	The Collection Methods of Invertabrate Animals	3+0	7.5
BİY526	Cytogenetics	3+0	7.5
BİY527	Plant Microbiology	3+0	7.5
BİY528	DNA Repair Mechanisms	3+0	7.5
BİY529	Landscape Ecology	3+0	7.5
BİY530	Plant Tissue Culture	3+0	7.5
BİY531	Immunology	3+0	7.5
BİY535	Mineral Feeding Physiology in Plants	3+0	7.5
BİY537	Stress Physiology in Plants	3+0	7.5
BİY539	Microbial Enzymes and Biotechnology	3+0	7.5
BİY543	Plant Molecular Biology	3+0	7.5
BİY546	Methods of Genetic Taxicology	3+0	7.5
BİY547	Forest and Park Trees	3+0	7.5
BİY551	Stem Cell Biology	3+0	7.5
BİY552	Plant Science	3+0	7.5
BİY553	The Ecology of Bird Communities	3+0	7.5
BİY555	Birds of Turkey	3+0	7.5
BİY556	Transmission Electron Microscopy and its Applications I	3+0	7.5
BİY557	Transmission Electron Microscopy And its Applications II	3+0	7.5
BİY560	Instrumental Analyses in Biochemistry	3+0	7.5
BİY561	Animal Cell Culture	3+0	7.5
BİY562	Molecular Biotechnology	3+0	7.5
BİY563	Halophilic Microorganisms and Their Potential in Biotechnology	3+0	7.5
BİY565	Extremophiles	3+0	7.5
BİY567	In-Vitro Techniques	3+0	7.5
BİY571	Taxonomy	3+0	7.5
BİY572	Molecular Biology Methods	3+0	7.5
BİY574	Foodborn Pathogen Microorganisms	3+0	7.5
BİY575	Microorganisms and Biotechnology	3+0	7.5
BİY577	Enzyme Technology	3+0	7.5
BİY578	Arachnology	3+0	7.5
BİY579	Plant Bacteriology	3+0	7.5
BİY581	Permaculture	3+0	7.5
BİY582	Cyanobacteria and Biotechnological Applications	3+0	7.5
BİY585	Advanced Biochemistry and Metabolism	3+0	7.5
BİY586	Systematics of Lichens	3+0	7.5
BİY593	Toxicology	3+0	7.5
BİY594	Nanomedicine and Application Fields	3+0	7.5
BİY703	Insect Physiology	3+0	7.5
BİY703 (Eng)	Insect Physiology	3+0	7.5
BİY704	Fundamentals of Ecotoxicology	3+0	7.5
BİY705	Insect Behavior	3+0	7.5
BİY706	Advanced Bioimaging Techniques	3+0	7.5
BİY707	Advanced Mycology	3+0	7.5
BİY708	Advantages and Disadvantages of Cell Culture	3+0	7.5
BİY709	Soil Microfungi	3+0	7.5
BİY711	Fauna of Turkey	3+0	7.5
BİY716	Microfungus Identification Techniques	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5

UBJ701	Research in Area of Specialization	3+0	4.5
UBJ702	Research in Area of Specialization	3+0	4.5

PROGRAM IN ECOLOGY

PROGRAM

I.Semester				II.Semester			
BİY583	Methods of Ecological Analysis	3+0	7.5	BİY502	Methods of Plant Identification	3+0	7.5
	Seçmeli Dersler	--	22.5	BİY538	Vegetation Ecology	3+0	7.5
				BİY592	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
BİY790	Thesis	0+1	30.0	BİY790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

BİY501	Herbarium Techniques	3+0	7.5
BİY506	Enzymatic Regulation	3+0	7.5
BİY507	Biology of Lichens	3+0	7.5
BİY509	Special Histology	3+0	7.5
BİY511	Gene Regulation	3+0	7.5
BİY512	Principles of Zoological Nomenclature	3+0	7.5
BİY514	The Harmful Insects	3+0	7.5
BİY515	Forest Ecology	3+0	7.5
BİY516	Bioenergetics	3+0	7.5
BİY517	Water Pollution and Biological Effect	3+0	7.5
BİY518	Signal Transduction in The Cell	3+0	7.5
BİY519	Limnology	3+0	7.5
BİY520	Bacterial Plant Diseases	3+0	7.5
BİY521	Biophotography	3+0	7.5
BİY522	Investigation Methods of Ecosystems	3+0	7.5
BİY524	Fishery Biology and Population Dynamics	3+0	7.5
BİY525	The Collection Methods of Invertabrate Animals	3+0	7.5
BİY526	Cytogenetics	3+0	7.5
BİY527	Plant Microbiology	3+0	7.5
BİY528	DNA Repair Mechanisms	3+0	7.5
BİY529	Landscape Ecology	3+0	7.5
BİY530	Plant Tissue Culture	3+0	7.5
BİY531	Immunology	3+0	7.5
BİY535	Mineral Feeding Physiology in Plants	3+0	7.5
BİY537	Stress Physiology in Plants	3+0	7.5
BİY539	Microbial Enzymes and Biotechnology	3+0	7.5
BİY543	Plant Molecular Biology	3+0	7.5
BİY546	Methods of Genetic Taxicology	3+0	7.5
BİY547	Forest and Park Trees	3+0	7.5
BİY551	Stem Cell Biology	3+0	7.5
BİY552	Plant Science	3+0	7.5
BİY553	The Ecology of Bird Communities	3+0	7.5
BİY555	Birds of Turkey	3+0	7.5
BİY556	Transmission Electron Microscopy and its Applications I	3+0	7.5

BİY557	Transmission Electron Microscopy And its Applications II	3+0	7.5
BİY560	Instrumental Analyses in Biochemistry	3+0	7.5
BİY561	Animal Cell Culture	3+0	7.5
BİY562	Molecular Biotechnology	3+0	7.5
BİY563	Halophilic Microorganisms and Their Potential in Biotechnology	3+0	7.5
BİY565	Extremophiles	3+0	7.5
BİY567	In-Vitro Techniques	3+0	7.5
BİY571	Taxonomy	3+0	7.5
BİY572	Molecular Biology Methods	3+0	7.5
BİY574	Foodborn Pathogen Microorganisms	3+0	7.5
BİY575	Microorganisms and Biotechnology	3+0	7.5
BİY577	Enzyme Technology	3+0	7.5
BİY578	Arachnology	3+0	7.5
BİY579	Plant Bacteriology	3+0	7.5
BİY581	Permaculture	3+0	7.5
BİY582	Cyanobacteria and Biotechnological Applications	3+0	7.5
BİY585	Advanced Biochemistry and Metabolism	3+0	7.5
BİY586	Systematics of Lichens	3+0	7.5
BİY593	Toxicology	3+0	7.5
BİY594	Nanomedicine and Application Fields	3+0	7.5
BİY703	Insect Physiology	3+0	7.5
BİY703 (Eng)	Insect Physiology	3+0	7.5
BİY704	Fundamentals of Ecotoxicology	3+0	7.5
BİY705	Insect Behavior	3+0	7.5
BİY706	Advanced Bioimaging Techniques	3+0	7.5
BİY707	Advanced Mycology	3+0	7.5
BİY708	Advantages and Disadvantages of Cell Culture	3+0	7.5
BİY709	Soil Microfungi	3+0	7.5
BİY711	Fauna of Turkey	3+0	7.5
BİY716	Microfungus Identification Techniques	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UBJ701	Research in Area of Specialization	3+0	4.5
UBJ702	Research in Area of Specialization	3+0	4.5

PROGRAM IN BIOLOGY

PROGRAM

	I.Semester				II.Semester		
BİY505	Bacteriology	3+0	7.5	BİY584	Advanced Microbial Physiology	3+0	7.5
BİY549	Modern Methods for Microbial Identification and Typing	3+0	7.5	BİY592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----
			30.0				30.0

	III.Semester				IV.Semester		
BİY790	Thesis	0+1	30.0	BİY790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

BİY501	Herbarium Techniques	3+0	7.5

BİY506	Enzymatic Regulation	3+0	7.5
BİY507	Biology of Lichens	3+0	7.5
BİY509	Special Histology	3+0	7.5
BİY511	Gene Regulation	3+0	7.5
BİY512	Principles of Zoological Nomenclature	3+0	7.5
BİY514	The Harmful Insects	3+0	7.5
BİY515	Forest Ecology	3+0	7.5
BİY516	Bioenergetics	3+0	7.5
BİY517	Water Pollution and Biological Effect	3+0	7.5
BİY518	Signal Transduction in The Cell	3+0	7.5
BİY519	Limnology	3+0	7.5
BİY520	Bacterial Plant Diseases	3+0	7.5
BİY521	Biophotography	3+0	7.5
BİY522	Investigation Methods of Ecosystems	3+0	7.5
BİY524	Fishery Biology and Population Dynamics	3+0	7.5
BİY525	The Collection Methods of Invertabrate Animals	3+0	7.5
BİY526	Cytogenetics	3+0	7.5
BİY527	Plant Microbiology	3+0	7.5
BİY528	DNA Repair Mechanisms	3+0	7.5
BİY529	Landscape Ecology	3+0	7.5
BİY530	Plant Tissue Culture	3+0	7.5
BİY531	Immunology	3+0	7.5
BİY535	Mineral Feeding Physiology in Plants	3+0	7.5
BİY537	Stress Physiology in Plants	3+0	7.5
BİY539	Microbial Enzymes and Biotechnology	3+0	7.5
BİY543	Plant Molecular Biology	3+0	7.5
BİY546	Methods of Genetic Taxicology	3+0	7.5
BİY547	Forest and Park Trees	3+0	7.5
BİY551	Stem Cell Biology	3+0	7.5
BİY552	Plant Science	3+0	7.5
BİY553	The Ecology of Bird Communities	3+0	7.5
BİY555	Birds of Turkey	3+0	7.5
BİY556	Transmission Electron Microscopy and its Applications I	3+0	7.5
BİY557	Transmission Electron Microscopy And its Applications II	3+0	7.5
BİY560	Instrumental Analyses in Biochemistry	3+0	7.5
BİY561	Animal Cell Culture	3+0	7.5
BİY562	Molecular Biotechnology	3+0	7.5
BİY563	Halophilic Microorganisms and Their Potential in Biotechnology	3+0	7.5
BİY565	Extremophiles	3+0	7.5
BİY567	In-Vitro Techniques	3+0	7.5
BİY571	Taxonomy	3+0	7.5
BİY572	Molecular Biology Methods	3+0	7.5
BİY574	Foodborn Pathogen Microorganisms	3+0	7.5
BİY575	Microorganisms and Biotechnology	3+0	7.5
BİY577	Enzyme Technology	3+0	7.5
BİY578	Arachnology	3+0	7.5
BİY579	Plant Bacteriology	3+0	7.5
BİY581	Permaculture	3+0	7.5
BİY582	Cyanobacteria and Biotechnological Applications	3+0	7.5
BİY585	Advanced Biochemistry and Metabolism	3+0	7.5
BİY586	Systematics of Lichens	3+0	7.5
BİY593	Toxicology	3+0	7.5
BİY594	Nanomedicine and Application Fields	3+0	7.5
BİY703	Insect Physiology	3+0	7.5
BİY703 (Eng)	Insect Physiology	3+0	7.5
BİY704	Fundamentals of Ecotoxicology	3+0	7.5
BİY705	Insect Behavior	3+0	7.5
BİY706	Advanced Bioimaging Techniques	3+0	7.5
BİY707	Advanced Mycology	3+0	7.5
BİY708	Advantages and Disadvantages of Cell Culture	3+0	7.5
BİY709	Soil Microfungi	3+0	7.5
BİY711	Fauna of Turkey	3+0	7.5
BİY716	Microfungus Identification Techniques	3+0	7.5

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UBJ701	Research in Area of Specialization	3+0	4.5
UBJ702	Research in Area of Specialization	3+0	4.5

PROGRAM IN MOLECULAR BIOLOGY

PROGRAM

I.Semester				II.Semester			
BİY511	Gene Regulation	3+0	7.5	BİY592	Seminar	3+0	7.5
BİY513	Advanced Cell Physiology	3+0	7.5	BİY710	Advance Molecular Genetic Methods	4+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
BİY790	Thesis	0+1	30.0	BİY790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

BİY501	Herbarium Techniques	3+0	7.5
BİY506	Enzymatic Regulation	3+0	7.5
BİY507	Biology of Lichens	3+0	7.5
BİY509	Special Histology	3+0	7.5
BİY511	Gene Regulation	3+0	7.5
BİY512	Principles of Zoological Nomenclature	3+0	7.5
BİY514	The Harmful Insects	3+0	7.5
BİY515	Forest Ecology	3+0	7.5
BİY516	Bioenergetics	3+0	7.5
BİY517	Water Pollution and Biological Effect	3+0	7.5
BİY518	Signal Transduction in The Cell	3+0	7.5
BİY519	Limnology	3+0	7.5
BİY520	Bacterial Plant Diseases	3+0	7.5
BİY521	Biophotography	3+0	7.5
BİY522	Investigation Methods of Ecosystems	3+0	7.5
BİY524	Fishery Biology and Population Dynamics	3+0	7.5
BİY525	The Collection Methods of Invertabrate Animals	3+0	7.5
BİY526	Cytogenetics	3+0	7.5
BİY527	Plant Microbiology	3+0	7.5
BİY528	DNA Repair Mechanisms	3+0	7.5
BİY529	Landscape Ecology	3+0	7.5
BİY530	Plant Tissue Culture	3+0	7.5
BİY531	Immunology	3+0	7.5
BİY535	Mineral Feeding Physiology in Plants	3+0	7.5
BİY537	Stress Physiology in Plants	3+0	7.5
BİY539	Microbial Enzymes and Biotechnology	3+0	7.5
BİY543	Plant Molecular Biology	3+0	7.5
BİY546	Methods of Genetic Taxicology	3+0	7.5
BİY547	Forest and Park Trees	3+0	7.5
BİY551	Stem Cell Biology	3+0	7.5
BİY552	Plant Science	3+0	7.5
BİY553	The Ecology of Bird Communities	3+0	7.5
BİY555	Birds of Turkey	3+0	7.5

BİY556	Transmission Electron Microscopy and its Applications I	3+0	7.5
BİY557	Transmission Electron Microscopy And its Applications II	3+0	7.5
BİY560	Instrumental Analyses in Biochemistry	3+0	7.5
BİY561	Animal Cell Culture	3+0	7.5
BİY562	Molecular Biotechnology	3+0	7.5
BİY563	Halophilic Microorganisms and Their Potential in Biotechnology	3+0	7.5
BİY565	Extremophiles	3+0	7.5
BİY567	In-Vitro Techniques	3+0	7.5
BİY571	Taxonomy	3+0	7.5
BİY572	Molecular Biology Methods	3+0	7.5
BİY574	Foodborn Pathogen Microorganisms	3+0	7.5
BİY575	Microorganisms and Biotechnology	3+0	7.5
BİY577	Enzyme Technology	3+0	7.5
BİY578	Arachnology	3+0	7.5
BİY579	Plant Bacteriology	3+0	7.5
BİY581	Permaculture	3+0	7.5
BİY582	Cyanobacteria and Biotechnological Applications	3+0	7.5
BİY585	Advanced Biochemistry and Metabolism	3+0	7.5
BİY586	Systematics of Lichens	3+0	7.5
BİY591	Advanced Molecular Biology and Genetics	4+0	7.5
BİY593	Toxicology	3+0	7.5
BİY594	Nanomedicine and Application Fields	3+0	7.5
BİY703	Insect Physiology	3+0	7.5
BİY703 (Eng)	Insect Physiology	3+0	7.5
BİY704	Fundamentals of Ecotoxicology	3+0	7.5
BİY705	Insect Behavior	3+0	7.5
BİY706	Advanced Bioimaging Techniques	3+0	7.5
BİY707	Advanced Mycology	3+0	7.5
BİY708	Advantages and Disadvantages of Cell Culture	3+0	7.5
BİY709	Soil Microfungi	3+0	7.5
BİY711	Fauna of Turkey	3+0	7.5
BİY716	Microfungus Identification Techniques	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UBJ701	Research in Area of Specialization	3+0	4.5
UBJ702	Research in Area of Specialization	3+0	4.5

PROGRAM IN FUNDAMENTAL AND INDUSTRIAL MICROBIOLOGY

PROGRAM

	I.Semester				**II.Semester**		
BİY505	Bacteriology	3+0	7.5	BİY584	Advanced Microbial Physiology	3+0	7.5
BİY549	Modern Methods for Microbial Identification and Typing	3+0	7.5	BİY592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

	III.Semester				**IV.Semester**		
BİY790	Thesis	0+1	30.0	BİY790	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

BİY501	Herbarium Techniques	3+0	7.5
BİY506	Enzymatic Regulation	3+0	7.5
BİY507	Biology of Lichens	3+0	7.5
BİY509	Special Histology	3+0	7.5
BİY511	Gene Regulation	3+0	7.5
BİY512	Principles of Zoological Nomenclature	3+0	7.5
BİY514	The Harmful Insects	3+0	7.5
BİY515	Forest Ecology	3+0	7.5
BİY516	Bioenergetics	3+0	7.5
BİY517	Water Pollution and Biological Effect	3+0	7.5
BİY518	Signal Transduction in The Cell	3+0	7.5
BİY519	Limnology	3+0	7.5
BİY520	Bacterial Plant Diseases	3+0	7.5
BİY521	Biophotography	3+0	7.5
BİY522	Investigation Methods of Ecosystems	3+0	7.5
BİY524	Fishery Biology and Population Dynamics	3+0	7.5
BİY525	The Collection Methods of Invertabrate Animals	3+0	7.5
BİY526	Cytogenetics	3+0	7.5
BİY527	Plant Microbiology	3+0	7.5
BİY528	DNA Repair Mechanisms	3+0	7.5
BİY529	Landscape Ecology	3+0	7.5
BİY530	Plant Tissue Culture	3+0	7.5
BİY531	Immunology	3+0	7.5
BİY535	Mineral Feeding Physiology in Plants	3+0	7.5
BİY537	Stress Physiology in Plants	3+0	7.5
BİY539	Microbial Enzymes and Biotechnology	3+0	7.5
BİY543	Plant Molecular Biology	3+0	7.5
BİY546	Methods of Genetic Taxicology	3+0	7.5
BİY547	Forest and Park Trees	3+0	7.5
BİY551	Stem Cell Biology	3+0	7.5
BİY552	Plant Science	3+0	7.5
BİY553	The Ecology of Bird Communities	3+0	7.5
BİY555	Birds of Turkey	3+0	7.5
BİY556	Transmission Electron Microscopy and its Applications I	3+0	7.5
BİY557	Transmission Electron Microscopy And its Applications II	3+0	7.5
BİY560	Instrumental Analyses in Biochemistry	3+0	7.5
BİY561	Animal Cell Culture	3+0	7.5
BİY562	Molecular Biotechnology	3+0	7.5
BİY563	Halophilic Microorganisms and Their Potential in Biotechnology	3+0	7.5
BİY565	Extremophiles	3+0	7.5
BİY567	In-Vitro Techniques	3+0	7.5
BİY571	Taxonomy	3+0	7.5
BİY572	Molecular Biology Methods	3+0	7.5
BİY574	Foodborn Pathogen Microorganisms	3+0	7.5
BİY575	Microorganisms and Biotechnology	3+0	7.5
BİY577	Enzyme Technology	3+0	7.5
BİY578	Arachnology	3+0	7.5
BİY579	Plant Bacteriology	3+0	7.5
BİY581	Permaculture	3+0	7.5
BİY582	Cyanobacteria and Biotechnological Applications	3+0	7.5
BİY585	Advanced Biochemistry and Metabolism	3+0	7.5
BİY586	Systematics of Lichens	3+0	7.5
BİY593	Toxicology	3+0	7.5
BİY594	Nanomedicine and Application Fields	3+0	7.5
BİY703	Insect Physiology	3+0	7.5
BİY703 (Eng)	Insect Physiology	3+0	7.5
BİY704	Fundamentals of Ecotoxicology	3+0	7.5
BİY705	Insect Behavior	3+0	7.5
BİY706	Advanced Bioimaging Techniques	3+0	7.5
BİY707	Advanced Mycology	3+0	7.5
BİY708	Advantages and Disadvantages of Cell Culture	3+0	7.5
BİY709	Soil Microfungi	3+0	7.5

BİY711	Fauna of Turkey	3+0	7.5
BİY716	Microfungus Identification Techniques	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UBJ701	Research in Area of Specialization	3+0	4.5
UBJ702	Research in Area of Specialization	3+0	4.5

PROGRAM IN ZOOLOGY

PROGRAM

I.Semester				II.Semester			
BİY523	Zootaxonomy	3+0	7.5	BİY592	Seminar	3+0	7.5
BİY712	Research Methods In Zoology	3+0	7.5	BİY714	Animal Ecology	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
BİY790	Thesis	0+1	30.0	BİY790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

BİY501	Herbarium Techniques	3+0	7.5
BİY506	Enzymatic Regulation	3+0	7.5
BİY507	Biology of Lichens	3+0	7.5
BİY509	Special Histology	3+0	7.5
BİY511	Gene Regulation	3+0	7.5
BİY512	Principles of Zoological Nomenclature	3+0	7.5
BİY514	The Harmful Insects	3+0	7.5
BİY515	Forest Ecology	3+0	7.5
BİY516	Bioenergetics	3+0	7.5
BİY517	Water Pollution and Biological Effect	3+0	7.5
BİY518	Signal Transduction in The Cell	3+0	7.5
BİY519	Limnology	3+0	7.5
BİY520	Bacterial Plant Diseases	3+0	7.5
BİY521	Biophotography	3+0	7.5
BİY522	Investigation Methods of Ecosystems	3+0	7.5
BİY524	Fishery Biology and Population Dynamics	3+0	7.5
BİY525	The Collection Methods of Invertabrate Animals	3+0	7.5
BİY526	Cytogenetics	3+0	7.5
BİY527	Plant Microbiology	3+0	7.5
BİY528	DNA Repair Mechanisms	3+0	7.5
BİY529	Landscape Ecology	3+0	7.5
BİY530	Plant Tissue Culture	3+0	7.5
BİY531	Immunology	3+0	7.5
BİY535	Mineral Feeding Physiology in Plants	3+0	7.5
BİY537	Stress Physiology in Plants	3+0	7.5
BİY539	Microbial Enzymes and Biotechnology	3+0	7.5
BİY543	Plant Molecular Biology	3+0	7.5
BİY546	Methods of Genetic Taxicology	3+0	7.5
BİY547	Forest and Park Trees	3+0	7.5
BİY551	Stem Cell Biology	3+0	7.5
BİY552	Plant Science	3+0	7.5

BİY553	The Ecology of Bird Communities	3+0	7.5
BİY555	Birds of Turkey	3+0	7.5
BİY556	Transmission Electron Microscopy and its Applications I	3+0	7.5
BİY557	Transmission Electron Microscopy And its Applications II	3+0	7.5
BİY560	Instrumental Analyses in Biochemistry	3+0	7.5
BİY561	Animal Cell Culture	3+0	7.5
BİY562	Molecular Biotechnology	3+0	7.5
BİY563	Halophilic Microorganisms and Their Potential in Biotechnology	3+0	7.5
BİY565	Extremophiles	3+0	7.5
BİY567	In-Vitro Techniques	3+0	7.5
BİY571	Taxonomy	3+0	7.5
BİY572	Molecular Biology Methods	3+0	7.5
BİY574	Foodborn Pathogen Microorganisms	3+0	7.5
BİY575	Microorganisms and Biotechnology	3+0	7.5
BİY577	Enzyme Technology	3+0	7.5
BİY578	Arachnology	3+0	7.5
BİY579	Plant Bacteriology	3+0	7.5
BİY581	Permaculture	3+0	7.5
BİY582	Cyanobacteria and Biotechnological Applications	3+0	7.5
BİY585	Advanced Biochemistry and Metabolism	3+0	7.5
BİY586	Systematics of Lichens	3+0	7.5
BİY593	Toxicology	3+0	7.5
BİY594	Nanomedicine and Application Fields	3+0	7.5
BİY703	Insect Physiology	3+0	7.5
BİY703 (Eng)	Insect Physiology	3+0	7.5
BİY704	Fundamentals of Ecotoxicology	3+0	7.5
BİY705	Insect Behavior	3+0	7.5
BİY706	Advanced Bioimaging Techniques	3+0	7.5
BİY707	Advanced Mycology	3+0	7.5
BİY708	Advantages and Disadvantages of Cell Culture	3+0	7.5
BİY709	Soil Microfungi	3+0	7.5
BİY711	Fauna of Turkey	3+0	7.5
BİY716	Microfungus Identification Techniques	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UBJ701	Research in Area of Specialization	3+0	4.5
UBJ702	Research in Area of Specialization	3+0	4.5

(NON-THESIS) MASTER OF SCIENCE (MS) DEGREE

PROGRAM IN BOTANY

PROGRAM

I.Semester				II.Semester			
BİY510	Flora of Turkey	3+0	7.5	BİY502	Methods of Plant Identification	3+0	7.5
BİY550	Molecular Techniques in Systematics	3+0	7.5	BİY599	Term Project Course	3+0	0.0
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	22.5
			-----				-----
			30.0				30.0

Elective Courses

BİY501	Herbarium Techniques	3+0	7.5
BİY506	Enzymatic Regulation	3+0	7.5
BİY507	Biology of Lichens	3+0	7.5
BİY509	Special Histology	3+0	7.5
BİY511	Gene Regulation	3+0	7.5
BİY512	Principles of Zoological Nomenclature	3+0	7.5
BİY514	The Harmful Insects	3+0	7.5
BİY515	Forest Ecology	3+0	7.5
BİY516	Bioenergetics	3+0	7.5
BİY517	Water Pollution and Biological Effect	3+0	7.5
BİY518	Signal Transduction in The Cell	3+0	7.5
BİY519	Limnology	3+0	7.5
BİY520	Bacterial Plant Diseases	3+0	7.5
BİY521	Biophotography	3+0	7.5
BİY522	Investigation Methods of Ecosystems	3+0	7.5
BİY524	Fishery Biology and Population Dynamics	3+0	7.5
BİY525	The Collection Methods of Invertabrate Animals	3+0	7.5
BİY526	Cytogenetics	3+0	7.5
BİY527	Plant Microbiology	3+0	7.5
BİY528	DNA Repair Mechanisms	3+0	7.5
BİY529	Landscape Ecology	3+0	7.5
BİY530	Plant Tissue Culture	3+0	7.5
BİY531	Immunology	3+0	7.5
BİY535	Mineral Feeding Physiology in Plants	3+0	7.5
BİY537	Stress Physiology in Plants	3+0	7.5
BİY539	Microbial Enzymes and Biotechnology	3+0	7.5
BİY543	Plant Molecular Biology	3+0	7.5
BİY546	Methods of Genetic Taxicology	3+0	7.5
BİY547	Forest and Park Trees	3+0	7.5
BİY551	Stem Cell Biology	3+0	7.5
BİY552	Plant Science	3+0	7.5
BİY553	The Ecology of Bird Communities	3+0	7.5
BİY555	Birds of Turkey	3+0	7.5
BİY556	Transmission Electron Microscopy and its Applications I	3+0	7.5
BİY557	Transmission Electron Microscopy And its Applications II	3+0	7.5
BİY560	Instrumental Analyses in Biochemistry	3+0	7.5
BİY561	Animal Cell Culture	3+0	7.5
BİY562	Molecular Biotechnology	3+0	7.5
BİY563	Halophilic Microorganisms and Their Potential in Biotechnology	3+0	7.5
BİY565	Extremophiles	3+0	7.5
BİY567	In-Vitro Techniques	3+0	7.5
BİY571	Taxonomy	3+0	7.5
BİY572	Molecular Biology Methods	3+0	7.5
BİY574	Foodborn Pathogen Microorganisms	3+0	7.5
BİY575	Microorganisms and Biotechnology	3+0	7.5
BİY577	Enzyme Technology	3+0	7.5
BİY578	Arachnology	3+0	7.5
BİY579	Plant Bacteriology	3+0	7.5
BİY581	Permaculture	3+0	7.5
BİY582	Cyanobacteria and Biotechnological Applications	3+0	7.5
BİY585	Advanced Biochemistry and Metabolism	3+0	7.5
BİY586	Systematics of Lichens	3+0	7.5
BİY593	Toxicology	3+0	7.5
BİY594	Nanomedicine and Application Fields	3+0	7.5
BİY703	Insect Physiology	3+0	7.5
BİY703 (Eng)	Insect Physiology	3+0	7.5
BİY704	Fundamentals of Ecotoxicology	3+0	7.5
BİY705	Insect Behavior	3+0	7.5
BİY706	Advanced Bioimaging Techniques	3+0	7.5
BİY707	Advanced Mycology	3+0	7.5
BİY708	Advantages and Disadvantages of Cell Culture	3+0	7.5
BİY709	Soil Microfungi	3+0	7.5
BİY711	Fauna of Turkey	3+0	7.5

BİY716	Microfungus Identification Techniques	3+0	7.5

PROGRAM IN ECOLOGY

PROGRAM

I.Semester				II.Semester			
BİY583	Methods of Ecological Analysis	3+0	7.5	BİY502	Methods of Plant Identification	3+0	7.5
	Seçmeli Dersler	--	22.5	BİY538	Vegetation Ecology	3+0	7.5
				BİY599	Term Project Course	3+0	0.0
					Seçmeli Dersler	--	15.0
			-----				-----
			30.0				30.0

Elective Courses

BİY501	Herbarium Techniques	3+0	7.5
BİY506	Enzymatic Regulation	3+0	7.5
BİY507	Biology of Lichens	3+0	7.5
BİY509	Special Histology	3+0	7.5
BİY511	Gene Regulation	3+0	7.5
BİY512	Principles of Zoological Nomenclature	3+0	7.5
BİY514	The Harmful Insects	3+0	7.5
BİY515	Forest Ecology	3+0	7.5
BİY516	Bioenergetics	3+0	7.5
BİY517	Water Pollution and Biological Effect	3+0	7.5
BİY518	Signal Transduction in The Cell	3+0	7.5
BİY519	Limnology	3+0	7.5
BİY520	Bacterial Plant Diseases	3+0	7.5
BİY521	Biophotography	3+0	7.5
BİY522	Investigation Methods of Ecosystems	3+0	7.5
BİY524	Fishery Biology and Population Dynamics	3+0	7.5
BİY525	The Collection Methods of Invertabrate Animals	3+0	7.5
BİY526	Cytogenetics	3+0	7.5
BİY527	Plant Microbiology	3+0	7.5
BİY528	DNA Repair Mechanisms	3+0	7.5
BİY529	Landscape Ecology	3+0	7.5
BİY530	Plant Tissue Culture	3+0	7.5
BİY531	Immunology	3+0	7.5
BİY535	Mineral Feeding Physiology in Plants	3+0	7.5
BİY537	Stress Physiology in Plants	3+0	7.5
BİY539	Microbial Enzymes and Biotechnology	3+0	7.5
BİY543	Plant Molecular Biology	3+0	7.5
BİY546	Methods of Genetic Taxicology	3+0	7.5
BİY547	Forest and Park Trees	3+0	7.5
BİY551	Stem Cell Biology	3+0	7.5
BİY552	Plant Science	3+0	7.5
BİY553	The Ecology of Bird Communities	3+0	7.5
BİY555	Birds of Turkey	3+0	7.5
BİY556	Transmission Electron Microscopy and its Applications I	3+0	7.5
BİY557	Transmission Electron Microscopy And its Applications II	3+0	7.5
BİY560	Instrumental Analyses in Biochemistry	3+0	7.5
BİY561	Animal Cell Culture	3+0	7.5
BİY562	Molecular Biotechnology	3+0	7.5
BİY563	Halophilic Microorganisms and Their Potential in Biotechnology	3+0	7.5
BİY565	Extremophiles	3+0	7.5
BİY567	In-Vitro Techniques	3+0	7.5

BİY571	Taxonomy	3+0	7.5
BİY572	Molecular Biology Methods	3+0	7.5
BİY574	Foodborn Pathogen Microorganisms	3+0	7.5
BİY575	Microorganisms and Biotechnology	3+0	7.5
BİY577	Enzyme Technology	3+0	7.5
BİY578	Arachnology	3+0	7.5
BİY579	Plant Bacteriology	3+0	7.5
BİY581	Permaculture	3+0	7.5
BİY582	Cyanobacteria and Biotechnological Applications	3+0	7.5
BİY585	Advanced Biochemistry and Metabolism	3+0	7.5
BİY586	Systematics of Lichens	3+0	7.5
BİY593	Toxicology	3+0	7.5
BİY594	Nanomedicine and Application Fields	3+0	7.5
BİY703	Insect Physiology	3+0	7.5
BİY703 (Eng)	Insect Physiology	3+0	7.5
BİY704	Fundamentals of Ecotoxicology	3+0	7.5
BİY705	Insect Behavior	3+0	7.5
BİY706	Advanced Bioimaging Techniques	3+0	7.5
BİY707	Advanced Mycology	3+0	7.5
BİY708	Advantages and Disadvantages of Cell Culture	3+0	7.5
BİY709	Soil Microfungi	3+0	7.5
BİY711	Fauna of Turkey	3+0	7.5
BİY716	Microfungus Identification Techniques	3+0	7.5

PROGRAM IN BIOLOGY

PROGRAM

I.Semester				II.Semester			
BİY505	Bacteriology	3+0	7.5	BİY584	Advanced Microbial Physiology	3+0	7.5
BİY549	Modern Methods for Microbial Identification and Typing	3+0	7.5	BİY599	Term Project Course	3+0	0.0
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	22.5
			-----				-----
			30.0				30.0

Elective Courses

BİY501	Herbarium Techniques	3+0	7.5
BİY506	Enzymatic Regulation	3+0	7.5
BİY507	Biology of Lichens	3+0	7.5
BİY509	Special Histology	3+0	7.5
BİY511	Gene Regulation	3+0	7.5
BİY512	Principles of Zoological Nomenclature	3+0	7.5
BİY514	The Harmful Insects	3+0	7.5
BİY515	Forest Ecology	3+0	7.5
BİY516	Bioenergetics	3+0	7.5
BİY517	Water Pollution and Biological Effect	3+0	7.5
BİY518	Signal Transduction in The Cell	3+0	7.5
BİY519	Limnology	3+0	7.5
BİY520	Bacterial Plant Diseases	3+0	7.5
BİY521	Biophotography	3+0	7.5
BİY522	Investigation Methods of Ecosystems	3+0	7.5
BİY524	Fishery Biology and Population Dynamics	3+0	7.5
BİY525	The Collection Methods of Invertabrate Animals	3+0	7.5
BİY526	Cytogenetics	3+0	7.5
BİY527	Plant Microbiology	3+0	7.5

BİY528	DNA Repair Mechanisms	3+0	7.5
BİY529	Landscape Ecology	3+0	7.5
BİY530	Plant Tissue Culture	3+0	7.5
BİY531	Immunology	3+0	7.5
BİY535	Mineral Feeding Physiology in Plants	3+0	7.5
BİY537	Stress Physiology in Plants	3+0	7.5
BİY539	Microbial Enzymes and Biotechnology	3+0	7.5
BİY543	Plant Molecular Biology	3+0	7.5
BİY546	Methods of Genetic Taxicology	3+0	7.5
BİY547	Forest and Park Trees	3+0	7.5
BİY551	Stem Cell Biology	3+0	7.5
BİY552	Plant Science	3+0	7.5
BİY553	The Ecology of Bird Communities	3+0	7.5
BİY555	Birds of Turkey	3+0	7.5
BİY556	Transmission Electron Microscopy and its Applications I	3+0	7.5
BİY557	Transmission Electron Microscopy And its Applications II	3+0	7.5
BİY560	Instrumental Analyses in Biochemistry	3+0	7.5
BİY561	Animal Cell Culture	3+0	7.5
BİY562	Molecular Biotechnology	3+0	7.5
BİY563	Halophilic Microorganisms and Their Potential in Biotechnology	3+0	7.5
BİY565	Extremophiles	3+0	7.5
BİY567	In-Vitro Techniques	3+0	7.5
BİY571	Taxonomy	3+0	7.5
BİY572	Molecular Biology Methods	3+0	7.5
BİY574	Foodborn Pathogen Microorganisms	3+0	7.5
BİY575	Microorganisms and Biotechnology	3+0	7.5
BİY577	Enzyme Technology	3+0	7.5
BİY578	Arachnology	3+0	7.5
BİY579	Plant Bacteriology	3+0	7.5
BİY581	Permaculture	3+0	7.5
BİY582	Cyanobacteria and Biotechnological Applications	3+0	7.5
BİY585	Advanced Biochemistry and Metabolism	3+0	7.5
BİY586	Systematics of Lichens	3+0	7.5
BİY593	Toxicology	3+0	7.5
BİY703	Insect Physiology	3+0	7.5
BİY703 (Eng)	Insect Physiology	3+0	7.5
BİY704	Fundamentals of Ecotoxicology	3+0	7.5
BİY705	Insect Behavior	3+0	7.5
BİY706	Advanced Bioimaging Techniques	3+0	7.5
BİY707	Advanced Mycology	3+0	7.5
BİY708	Advantages and Disadvantages of Cell Culture	3+0	7.5
BİY709	Soil Microfungi	3+0	7.5
BİY711	Fauna of Turkey	3+0	7.5
BİY716	Microfungus Identification Techniques	3+0	7.5

PROGRAM IN MOLECULAR BIOLOGY

PROGRAM

I.Semester					II.Semester		
BİY511	Gene Regulation	3+0	7.5	BİY599	Term Project Course	3+0	0.0
BİY513	Advanced Cell Physiology	3+0	7.5	BİY710	Advance Molecular Genetic Methods	4+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	22.5
			-----				-----
			30.0				30.0

Elective Courses

BİY501	Herbarium Techniques	3+0	7.5
BİY506	Enzymatic Regulation	3+0	7.5
BİY507	Biology of Lichens	3+0	7.5
BİY509	Special Histology	3+0	7.5
BİY512	Principles of Zoological Nomenclature	3+0	7.5
BİY514	The Harmful Insects	3+0	7.5
BİY515	Forest Ecology	3+0	7.5
BİY516	Bioenergetics	3+0	7.5
BİY517	Water Pollution and Biological Effect	3+0	7.5
BİY518	Signal Transduction in The Cell	3+0	7.5
BİY519	Limnology	3+0	7.5
BİY520	Bacterial Plant Diseases	3+0	7.5
BİY521	Biophotography	3+0	7.5
BİY522	Investigation Methods of Ecosystems	3+0	7.5
BİY524	Fishery Biology and Population Dynamics	3+0	7.5
BİY525	The Collection Methods of Invertabrate Animals	3+0	7.5
BİY526	Cytogenetics	3+0	7.5
BİY527	Plant Microbiology	3+0	7.5
BİY528	DNA Repair Mechanisms	3+0	7.5
BİY529	Landscape Ecology	3+0	7.5
BİY530	Plant Tissue Culture	3+0	7.5
BİY531	Immunology	3+0	7.5
BİY535	Mineral Feeding Physiology in Plants	3+0	7.5
BİY537	Stress Physiology in Plants	3+0	7.5
BİY539	Microbial Enzymes and Biotechnology	3+0	7.5
BİY543	Plant Molecular Biology	3+0	7.5
BİY546	Methods of Genetic Taxicology	3+0	7.5
BİY547	Forest and Park Trees	3+0	7.5
BİY551	Stem Cell Biology	3+0	7.5
BİY552	Plant Science	3+0	7.5
BİY553	The Ecology of Bird Communities	3+0	7.5
BİY555	Birds of Turkey	3+0	7.5
BİY556	Transmission Electron Microscopy and its Applications I	3+0	7.5
BİY557	Transmission Electron Microscopy And its Applications II	3+0	7.5
BİY560	Instrumental Analyses in Biochemistry	3+0	7.5
BİY561	Animal Cell Culture	3+0	7.5
BİY562	Molecular Biotechnology	3+0	7.5
BİY563	Halophilic Microorganisms and Their Potential in Biotechnology	3+0	7.5
BİY565	Extremophiles	3+0	7.5
BİY567	In-Vitro Techniques	3+0	7.5
BİY571	Taxonomy	3+0	7.5
BİY572	Molecular Biology Methods	3+0	7.5
BİY574	Foodborn Pathogen Microorganisms	3+0	7.5
BİY575	Microorganisms and Biotechnology	3+0	7.5
BİY577	Enzyme Technology	3+0	7.5
BİY578	Arachnology	3+0	7.5
BİY579	Plant Bacteriology	3+0	7.5
BİY581	Permaculture	3+0	7.5
BİY582	Cyanobacteria and Biotechnological Applications	3+0	7.5
BİY585	Advanced Biochemistry and Metabolism	3+0	7.5
BİY586	Systematics of Lichens	3+0	7.5
BİY591	Advanced Molecular Biology and Genetics	4+0	7.5
BİY593	Toxicology	3+0	7.5
BİY594	Nanomedicine and Application Fields	3+0	7.5
BİY703	Insect Physiology	3+0	7.5
BİY703 (Eng)	Insect Physiology	3+0	7.5
BİY704	Fundamentals of Ecotoxicology	3+0	7.5
BİY705	Insect Behavior	3+0	7.5
BİY706	Advanced Bioimaging Techniques	3+0	7.5
BİY707	Advanced Mycology	3+0	7.5
BİY708	Advantages and Disadvantages of Cell Culture	3+0	7.5
BİY709	Soil Microfungi	3+0	7.5
BİY711	Fauna of Turkey	3+0	7.5

BİY716	Microfungus Identification Techniques	3+0	7.5

PROGRAM IN FUNDAMENTAL AND INDUSTRIYAL MICROBIOLOGY

PROGRAM

I.Semester				II.Semester			
BİY505	Bacteriology	3+0	7.5	BİY584	Advanced Microbial Physiology	3+0	7.5
BİY549	Modern Methods for Microbial Identification and Typing	3+0	7.5	BİY599	Term Project Course	3+0	0.0
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	22.5
			-----				-----
			30.0				30.0

Foreign Language Courses

BİY594	Nanomedicine and Application Fields	3+0	7.5

Elective Courses

BİY501	Herbarium Techniques	3+0	7.5
BİY506	Enzymatic Regulation	3+0	7.5
BİY507	Biology of Lichens	3+0	7.5
BİY509	Special Histology	3+0	7.5
BİY511	Gene Regulation	3+0	7.5
BİY512	Principles of Zoological Nomenclature	3+0	7.5
BİY514	The Harmful Insects	3+0	7.5
BİY515	Forest Ecology	3+0	7.5
BİY516	Bioenergetics	3+0	7.5
BİY517	Water Pollution and Biological Effect	3+0	7.5
BİY518	Signal Transduction in The Cell	3+0	7.5
BİY519	Limnology	3+0	7.5
BİY520	Bacterial Plant Diseases	3+0	7.5
BİY521	Biophotography	3+0	7.5
BİY522	Investigation Methods of Ecosystems	3+0	7.5
BİY524	Fishery Biology and Population Dynamics	3+0	7.5
BİY525	The Collection Methods of Invertabrate Animals	3+0	7.5
BİY526	Cytogenetics	3+0	7.5
BİY527	Plant Microbiology	3+0	7.5
BİY528	DNA Repair Mechanisms	3+0	7.5
BİY529	Landscape Ecology	3+0	7.5
BİY530	Plant Tissue Culture	3+0	7.5
BİY531	Immunology	3+0	7.5
BİY535	Mineral Feeding Physiology in Plants	3+0	7.5
BİY537	Stress Physiology in Plants	3+0	7.5
BİY539	Microbial Enzymes and Biotechnology	3+0	7.5
BİY543	Plant Molecular Biology	3+0	7.5
BİY546	Methods of Genetic Taxicology	3+0	7.5
BİY547	Forest and Park Trees	3+0	7.5
BİY551	Stem Cell Biology	3+0	7.5
BİY552	Plant Science	3+0	7.5
BİY553	The Ecology of Bird Communities	3+0	7.5
BİY555	Birds of Turkey	3+0	7.5
BİY556	Transmission Electron Microscopy and its Applications I	3+0	7.5
BİY557	Transmission Electron Microscopy And its Applications II	3+0	7.5
BİY560	Instrumental Analyses in Biochemistry	3+0	7.5
BİY561	Animal Cell Culture	3+0	7.5
BİY562	Molecular Biotechnology	3+0	7.5

BİY563	Halophilic Microorganisms and Their Potential in Biotechnology	3+0	7.5
BİY565	Extremophiles	3+0	7.5
BİY567	In-Vitro Techniques	3+0	7.5
BİY571	Taxonomy	3+0	7.5
BİY572	Molecular Biology Methods	3+0	7.5
BİY574	Foodborn Pathogen Microorganisms	3+0	7.5
BİY575	Microorganisms and Biotechnology	3+0	7.5
BİY577	Enzyme Technology	3+0	7.5
BİY578	Arachnology	3+0	7.5
BİY579	Plant Bacteriology	3+0	7.5
BİY581	Permaculture	3+0	7.5
BİY582	Cyanobacteria and Biotechnological Applications	3+0	7.5
BİY585	Advanced Biochemistry and Metabolism	3+0	7.5
BİY586	Systematics of Lichens	3+0	7.5
BİY593	Toxicology	3+0	7.5
BİY703	Insect Physiology	3+0	7.5
BİY703 (Eng)	Insect Physiology	3+0	7.5
BİY704	Fundamentals of Ecotoxicology	3+0	7.5
BİY705	Insect Behavior	3+0	7.5
BİY706	Advanced Bioimaging Techniques	3+0	7.5
BİY707	Advanced Mycology	3+0	7.5
BİY708	Advantages and Disadvantages of Cell Culture	3+0	7.5
BİY709	Soil Microfungi	3+0	7.5
BİY711	Fauna of Turkey	3+0	7.5
BİY716	Microfungus Identification Techniques	3+0	7.5

PROGRAM IN ZOOLOGY

PROGRAM

I.Semester				II.Semester			
BİY523	Zootaxonomy	3+0	7.5	BİY599	Term Project Course	3+0	0.0
BİY712	Research Methods In Zoology	3+0	7.5	BİY714	Animal Ecology	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	22.5
			-----				-----
			30.0				30.0

Elective Courses

BİY501	Herbarium Techniques	3+0	7.5
BİY506	Enzymatic Regulation	3+0	7.5
BİY507	Biology of Lichens	3+0	7.5
BİY509	Special Histology	3+0	7.5
BİY511	Gene Regulation	3+0	7.5
BİY512	Principles of Zoological Nomenclature	3+0	7.5
BİY514	The Harmful Insects	3+0	7.5
BİY515	Forest Ecology	3+0	7.5
BİY516	Bioenergetics	3+0	7.5
BİY517	Water Pollution and Biological Effect	3+0	7.5
BİY518	Signal Transduction in The Cell	3+0	7.5
BİY519	Limnology	3+0	7.5
BİY520	Bacterial Plant Diseases	3+0	7.5
BİY521	Biophotography	3+0	7.5
BİY522	Investigation Methods of Ecosystems	3+0	7.5
BİY524	Fishery Biology and Population Dynamics	3+0	7.5
BİY525	The Collection Methods of Invertabrate Animals	3+0	7.5
BİY526	Cytogenetics	3+0	7.5
BİY527	Plant Microbiology	3+0	7.5

BİY528	DNA Repair Mechanisms	3+0	7.5
BİY529	Landscape Ecology	3+0	7.5
BİY530	Plant Tissue Culture	3+0	7.5
BİY531	Immunology	3+0	7.5
BİY535	Mineral Feeding Physiology in Plants	3+0	7.5
BİY537	Stress Physiology in Plants	3+0	7.5
BİY539	Microbial Enzymes and Biotechnology	3+0	7.5
BİY543	Plant Molecular Biology	3+0	7.5
BİY546	Methods of Genetic Taxicology	3+0	7.5
BİY547	Forest and Park Trees	3+0	7.5
BİY551	Stem Cell Biology	3+0	7.5
BİY552	Plant Science	3+0	7.5
BİY553	The Ecology of Bird Communities	3+0	7.5
BİY555	Birds of Turkey	3+0	7.5
BİY556	Transmission Electron Microscopy and its Applications I	3+0	7.5
BİY557	Transmission Electron Microscopy And its Applications II	3+0	7.5
BİY560	Instrumental Analyses in Biochemistry	3+0	7.5
BİY561	Animal Cell Culture	3+0	7.5
BİY562	Molecular Biotechnology	3+0	7.5
BİY563	Halophilic Microorganisms and Their Potential in Biotechnology	3+0	7.5
BİY565	Extremophiles	3+0	7.5
BİY567	In-Vitro Techniques	3+0	7.5
BİY571	Taxonomy	3+0	7.5
BİY572	Molecular Biology Methods	3+0	7.5
BİY574	Foodborn Pathogen Microorganisms	3+0	7.5
BİY575	Microorganisms and Biotechnology	3+0	7.5
BİY577	Enzyme Technology	3+0	7.5
BİY578	Arachnology	3+0	7.5
BİY579	Plant Bacteriology	3+0	7.5
BİY581	Permaculture	3+0	7.5
BİY582	Cyanobacteria and Biotechnological Applications	3+0	7.5
BİY585	Advanced Biochemistry and Metabolism	3+0	7.5
BİY586	Systematics of Lichens	3+0	7.5
BİY593	Toxicology	3+0	7.5
BİY594	Nanomedicine and Application Fields	3+0	7.5
BİY703	Insect Physiology	3+0	7.5
BİY703 (Eng)	Insect Physiology	3+0	7.5
BİY704	Fundamentals of Ecotoxicology	3+0	7.5
BİY705	Insect Behavior	3+0	7.5
BİY706	Advanced Bioimaging Techniques	3+0	7.5
BİY707	Advanced Mycology	3+0	7.5
BİY708	Advantages and Disadvantages of Cell Culture	3+0	7.5
BİY709	Soil Microfungi	3+0	7.5
BİY711	Fauna of Turkey	3+0	7.5
BİY716	Microfungus Identification Techniques	3+0	7.5

DEPARTMENT OF ENVIRONMENTAL ENGINEERING

Head : Prof.Dr. Aysun ÖZKAN

PROGRAM IN ENVIRONMENTAL MANAGEMENT (DISTANCE LEARNING)

PROGRAM

I.Semester **II.Semester**

	Seçmeli Dersler	- -	30.0	ÇYÖ599	Term Project	3+0	0.0
					Seçmeli Dersler	--	30.0
			-----				-----
			30.0				30.0

Elective Courses

ÇYÖ501	Domestic Wastewater Management	3+0	7.5
ÇYÖ502	Hazardous Waste Engineering and Management by Decision Making	3+0	7.5
ÇYÖ503	Legislation on Environmental Issues I	3+0	7.5
ÇYÖ504	Legislation on Environmental Issues II	3+0	7.5
ÇYÖ505	Bioenergy Production	3+0	7.5
ÇYÖ506	Quality Management System Approach in Testing Laboratories	3+0	7.5
ÇYÖ507	Industrial Wastewater Control	3+0	7.5
ÇYÖ508	Drinking Water Qality and Control	3+0	7.5
ÇYÖ510	Determining the Environmental Performance of Products and Processes	3+0	7.5
ÇYÖ512	Indoor Air Quality Measurement	3+0	7.5
ÇYÖ514	Urban Air Quality Management	3+0	7.5
ÇYÖ515	Global Climate Change and Natural/Meteorological Disasters	3+0	7.5
ÇYÖ516	Ecosystem Ecology	3+0	7.5
ÇYÖ517	Air Quality Management	3+0	7.5
ÇYÖ519	Data Analysis in Environmental Science	3+0	7.5
UCS572	Remote Sensing and Geographical Information Sytems in Environmental Management	3+0	7.5

DOCTORATE DEGREE (PH.D)

PROGRAM

	I.Semester				**II.Semester**		
	Seçmeli Dersler	- -	30.0	ÇEV692	Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
			-----				-----
			30.0				30.0

	III.Semester				**IV.Semester**		
DYS000	Qualifying Exam	0+0	0.0	ÇEV890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

	V.Semester				**VI.Semester**		
ÇEV890	Thesis	0+1	30.0	ÇEV890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

	VII.Semester				**VIII.Semester**		
ÇEV890	Thesis	0+1	30.0	ÇEV890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

ÇEV601	Special Topics in Environmental Engineering II	3+0	7.5
ÇEV604	Environmental Organic Chemistry	3+0	7.5

ÇEV609	Engineering for Sustainable Environment	3+0	7.5
ÇEV610	Industrial Environmental Quality Management	3+0	7.5
ÇEV611	Risk Assessment for Environmental Health	3+0	7.5
ÇEV612	Transfer Mechanisms of Incineration Processes	3+0	7.5
ÇEV614	Advanced Solid Waste Management II	3+0	7.5
ÇEV616	Advanced Disinfection Techniques	3+0	7.5
ÇEV617	Thermal Conversion Technologies	3+0	7.5
ÇEV619	Environment Quality Development Plans	3+0	7.5
ÇEV620	Transport and Fate of Pollutants in Water Systems	3+0	7.5
ÇEV621	Advanced Techniques for Atmospherıc Analyses	3+0	7.5
ÇEV623	Global Warming Parameters and Control Techniques	3+0	7.5
ÇEV624	Atmospheric Chemistry	3+0	7.5
ÇEV625	Integrated Natural Resource Management	3+0	7.5
ÇEV626	Nanotechnology Applications in Water and Wastewater Treatment	3+0	7.5
ÇEV627	Environmental Biotechnology	3+0	7.5
ÇEV629	Biodiversity and Protected	3+0	7.5
ÇEV631	Electrochemical Water and Wastewater Treatment	3+0	7.5
ÇEV633	Biological Treatment Of Industrial Wastes	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UÇV901	Research in Area of Specialization	5+0	7.5
UÇV902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

	I.Semester				II.Semester		
ÇEV523	Instrumental Analysis and Evaluation Methods in Environmental Engineering	3+0	7.5	ÇEV592	Seminar	3+0	7.5
ÇEV531	Statistical Analysis of Engineering Data	3+0	7.5	MAT517	Applied Mathematics	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

	III.Semester				IV.Semester		
ÇEV790	Thesis	0+1	30.0	ÇEV790	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

ÇEV501	Special Topics in Environmental Engineering I	3+0	7.5
ÇEV507	Biomoleculer Techniques in Water Treatment	3+0	7.5
ÇEV508	Microplastic Pollutants	3+0	7.5
ÇEV510	Sustainable Waste Management and Circular Economy	3+0	7.5
ÇEV517	Modeling of Air Pollution	3+0	7.5
ÇEV524	Ecotoxicological Risks of Pollutants	3+0	7.5
ÇEV525	Biomonitoring and Techniques in Monitoring Environmental Quality	3+0	7.5
ÇEV526	Integrated Waste Management Economics	3+0	7.5
ÇEV527	Advanced Solid Waste Management I	3+0	7.5
ÇEV528	Industrial Air Pollutionand Control	3+0	7.5
ÇEV530	Anaerobic Biotechnology for the Treatment of Wastes	3+0	7.5
ÇEV533	Nonpoint Source Pollution	3+0	7.5
ÇEV535	Groundwater Pollution and Treatment	3+0	7.5

ÇEV536	Natural Treatment Systems	3+0	7.5
ÇEV539	Life Cycle Assessment	3+0	7.5
ÇEV540	Modelling of Environmental Systems	3+0	7.5
ÇEV541	Water Treatment Technologies and Applications	3+0	7.5
ÇEV542	Nitrogen and Phosphorus Removal from Municipal Wastewater	3+0	7.5
ÇEV543	Accreditation Process of Test Laboratories	3+0	7.5
ÇEV544	Metal Pollution and Environment	3+0	7.5
ÇEV545	Advanced Microbial Ecology	3+0	7.5
ÇEV546	Advanced Treatment Techniques	3+0	7.5
ÇEV547	Special Waste Management	3+0	7.5
ÇEV549	Advanced Techniques in Hazardous Waste Management	3+0	7.5
ÇEV551	Industrial Processes and Pollution Prevention	3+0	7.5
ÇEV552	Contaminated Site Remediation	3+0	7.5
ÇEV553	Green Building Certification Programs and Applications	3+0	7.5
ÇEV555	Different Decision Making Techniques in Environmental Management	3+0	7.5
ÇEV557	Scientific Research Processes	3+0	7.5
ÇEV559	Environmental Biogeochemistry	3+0	7.5
ÇEV561	Small Scale Drinking and Potable Water Treatment	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UÇV701	Research in Area of Specialization	3+0	4.5
UÇV702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING (ENGLISH)

Head : Prof.Dr. Nuray AT

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester

Seçmeli Dersler	-	30.0	
	-		

		30.0	

II.Semester

EEM692	Seminar	3+0	7.5
	Seçmeli Dersler	--	22.5

			30.0

III.Semester

DYS000	Qualifying Exam	0+0	0.0	

			--	
				30.0

IV.Semester

EEM890-0	Thesis (Thesis Proposal)	0+1	30.0

			30.0

V.Semester

EEM890 (Eng)	Thesis	0+1	30.0	

			30.0	

VI.Semester

EEM890 (Eng)	Thesis	0+1	30.0

			30.0

VII.Semester

EEM890 (Eng)	Thesis	0+1	30.0

VIII.Semester

EEM890 (Eng)	Thesis	0+1	30.0

		-----	-----
		30.0	30.0

Elective Courses

EEM603 (Eng)	Function Space Methods in Engineering	3+0	7.5
EEM604 (Eng)	Optimization in Power Systems	3+0	7.5
EEM605 (Eng)	Power Systems Stability	3+0	7.5
EEM606 (Eng)	Parallel Computer Architecture	3+0	7.5
EEM607 (Eng)	Parallel Computing	3+0	7.5
EEM608 (Eng)	Advanced Linear Control Design	3+0	7.5
EEM609 (Eng)	Multivariable Control Systems I	3+0	7.5
EEM610 (Eng)	Multivariable Control Systems II	3+0	7.5
EEM617 (Eng)	Special Topics in Systems Theory	3+0	7.5
EEM618 (Eng)	Power Quality Analysis	3+0	7.5
EEM619 (Eng)	Wireless Communication	3+0	7.5
EEM620 (Eng)	Special Topics in Control Engineering	3+0	7.5
EEM621 (Eng)	Nano and Micro-Fabrication Techniques	3+0	7.5
EEM623 (Eng)	Advanced Digital Signal Processing	3+0	7.5
EEM624 (Eng)	Advanced Topics in Deep Learning	3+0	7.5
EEM625 (Eng)	Advanced Topics in Digital Systems I	3+0	7.5
EEM641 (Eng)	Sensor Array Signal Processing	3+0	7.5
EEM642 (Eng)	Linear Systems Theory II	3+0	7.5
EEM643 (Eng)	Estimation Theory	3+0	7.5
EEM645 (Eng)	System Identification	3+0	7.5
EEM646 (Eng)	Fuzzy Systems	3+0	7.5
EEM651 (Eng)	Signal Transforms	3+0	7.5
EEM652 (Eng)	Optimal Control	3+0	7.5
EEM656 (Eng)	Large-scale Systems	3+0	7.5
EEM657 (Eng)	Control of Robotic Systems	3+0	7.5
EEM658 (Eng)	Adaptive Control	3+0	7.5
EEM660 (Eng)	Discrete Event Systems	3+0	7.5
EEM661 (Eng)	Advantage in Cryptology	3+0	7.5
EEM667 (Eng)	Statistical Signal Processing	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UEE901 (Eng)	Research in Area of Specialization	5+0	7.5
UEE902 (Eng)	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM IN CIRCUITS AND SYSTEMS THEORY (ENGLISH)

PROGRAM

I.Semester				II.Semester			
EEM504 (Eng)	Random Variables and Stochastic Processes	3+0	7.5	EEM592 (Eng)	Seminar	3+0	7.5
EEM511 (Eng)	Introduction to Machine Learning	3+0	7.5		*Seçmeli Dersler*	--	22.5
EEM567 (Eng)	Advanced Computer Architecture	3+0	7.5				
	Seçmeli Dersler	--	7.5				
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
EEM790 (Eng)	Thesis	0+1	30.0	EEM790 (Eng)	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

EEM508 (Eng)	Reliability Analysis in Power System	3+0	7.5
EEM513 (Eng)	Network Security and BlockChain	3+0	7.5
EEM515 (Eng)	Dynamics of Electrical Machinery	3+0	7.5
EEM527 (Eng)	Advanced Power Electronics Circuits	3+0	7.5
EEM528 (Eng)	GPU Computing	3+0	7.5
EEM530 (Eng)	Hardware Security and Trusted Circuit Design	3+0	7.5
EEM534 (Eng)	Data-Communication Networks	3+0	7.5
EEM541 (Eng)	Linear Systems Theory I	3+0	7.5
EEM545 (Eng)	System Modeling	3+0	7.5
EEM546 (Eng)	Fundamentals of Robotics	3+0	7.5
EEM548 (Eng)	Power System Protection	3+0	7.5
EEM553 (Eng)	Digital Control Theory	3+0	7.5
EEM554 (Eng)	Nonlinear Control Systems	3+0	7.5
EEM561 (Eng)	Machine Vision	3+0	7.5
EEM564 (Eng)	Artificial Neural Networks	3+0	7.5
EEM565 (Eng)	Image Processing	3+0	7.5
EEM566 (Eng)	Pattern Recognition	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MAT507 (Eng)	Applied Mathematics I	3+0	7.5
MAT508 (Eng)	Applied Mathematics II	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UEE701 (Eng)	Research in Area of Specialization	3+0	4.5
UEE702 (Eng)	Research in Area of Specialization	3+0	4.5

PROGRAM IN ELECTRIAL MACHINERY (ENGILSH)

PROGRAM

I.Semester				II.Semester			
EEM501 (Eng)	Advanced Power System Analysis and Smart Grids	3+0	7.5	EEM549 (Eng)	Advanced Electrical Machinery	3+0	7.5
EEM504 (Eng)	Random Variables and Stochastic Processes	3+0	7.5	EEM592 (Eng)	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
EEM790 (Eng)	Thesis	0+1	30.0	EEM790 (Eng)	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

EEM508 (Eng)	Reliability Analysis in Power System	3+0	7.5
EEM513 (Eng)	Network Security and BlockChain	3+0	7.5
EEM515 (Eng)	Dynamics of Electrical Machinery	3+0	7.5
EEM527 (Eng)	Advanced Power Electronics Circuits	3+0	7.5
EEM528 (Eng)	GPU Computing	3+0	7.5
EEM530 (Eng)	Hardware Security and Trusted Circuit Design	3+0	7.5
EEM534 (Eng)	Data-Communication Networks	3+0	7.5
EEM541 (Eng)	Linear Systems Theory I	3+0	7.5

EEM545 (Eng)	System Modeling	3+0	7.5
EEM546 (Eng)	Fundamentals of Robotics	3+0	7.5
EEM548 (Eng)	Power System Protection	3+0	7.5
EEM553 (Eng)	Digital Control Theory	3+0	7.5
EEM554 (Eng)	Nonlinear Control Systems	3+0	7.5
EEM561 (Eng)	Machine Vision	3+0	7.5
EEM564 (Eng)	Artificial Neural Networks	3+0	7.5
EEM565 (Eng)	Image Processing	3+0	7.5
EEM566 (Eng)	Pattern Recognition	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MAT507 (Eng)	Applied Mathematics I	3+0	7.5
MAT508 (Eng)	Applied Mathematics II	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UEE701 (Eng)	Research in Area of Specialization	3+0	4.5
UEE702 (Eng)	Research in Area of Specialization	3+0	4.5

PROGRAM IN ELECTRICAL INSTALLATION SYSTEMS (ENGLISH)

PROGRAM

I.Semester				II.Semester			
EEM501 (Eng)	Advanced Power System Analysis and Smart Grids	3+0	7.5	EEM547 (Eng)	Fundamentals of Detection and Estimation	3+0	7.5
	Seçmeli Dersler	--	22.5	EEM549 (Eng)	Advanced Electrical Machinery	3+0	7.5
				EEM592 (Eng)	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
EEM790 (Eng)	Thesis	0+1	30.0	EEM790 (Eng)	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

EEM504 (Eng)	Random Variables and Stochastic Processes	3+0	7.5
EEM508 (Eng)	Reliability Analysis in Power System	3+0	7.5
EEM513 (Eng)	Network Security and BlockChain	3+0	7.5
EEM515 (Eng)	Dynamics of Electrical Machinery	3+0	7.5
EEM527 (Eng)	Advanced Power Electronics Circuits	3+0	7.5
EEM528 (Eng)	GPU Computing	3+0	7.5
EEM530 (Eng)	Hardware Security and Trusted Circuit Design	3+0	7.5
EEM534 (Eng)	Data-Communication Networks	3+0	7.5
EEM545 (Eng)	System Modeling	3+0	7.5
EEM546 (Eng)	Fundamentals of Robotics	3+0	7.5
EEM548 (Eng)	Power System Protection	3+0	7.5
EEM553 (Eng)	Digital Control Theory	3+0	7.5
EEM554 (Eng)	Nonlinear Control Systems	3+0	7.5
EEM561 (Eng)	Machine Vision	3+0	7.5
EEM564 (Eng)	Artificial Neural Networks	3+0	7.5
EEM565 (Eng)	Image Processing	3+0	7.5
EEM566 (Eng)	Pattern Recognition	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MAT507 (Eng)	Applied Mathematics I	3+0	7.5
MAT508 (Eng)	Applied Mathematics II	3+0	7.5

TAÇ701	Thesis Research Study Course	3+0	7.5
UEE701 (Eng)	Research in Area of Specialization	3+0	4.5
UEE702 (Eng)	Research in Area of Specialization	3+0	4.5

PROGRAM IN ELECTROMAGNETIC FIELDS AND MICROWAVE TECHNIQUE (ENGILSH)

PROGRAM

I.Semester				II.Semester			
EEM507 (Eng)	Integrated Optical Waveguides	3+0	7.5	EEM502 (Eng)	Antenna Engineering	3+0	7.5
EEM509 (Eng)	Radio Frequency and Microware Circuits	3+0	7.5	EEM592 (Eng)	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
EEM790 (Eng)	Thesis	0+1	30.0	EEM790 (Eng)	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

EEM508 (Eng)	Reliability Analysis in Power System	3+0	7.5
EEM513 (Eng)	Network Security and BlockChain	3+0	7.5
EEM515 (Eng)	Dynamics of Electrical Machinery	3+0	7.5
EEM527 (Eng)	Advanced Power Electronics Circuits	3+0	7.5
EEM528 (Eng)	GPU Computing	3+0	7.5
EEM530 (Eng)	Hardware Security and Trusted Circuit Design	3+0	7.5
EEM534 (Eng)	Data-Communication Networks	3+0	7.5
EEM545 (Eng)	System Modeling	3+0	7.5
EEM546 (Eng)	Fundamentals of Robotics	3+0	7.5
EEM548 (Eng)	Power System Protection	3+0	7.5
EEM553 (Eng)	Digital Control Theory	3+0	7.5
EEM554 (Eng)	Nonlinear Control Systems	3+0	7.5
EEM561 (Eng)	Machine Vision	3+0	7.5
EEM564 (Eng)	Artificial Neural Networks	3+0	7.5
EEM565 (Eng)	Image Processing	3+0	7.5
EEM566 (Eng)	Pattern Recognition	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MAT507 (Eng)	Applied Mathematics I	3+0	7.5
MAT508 (Eng)	Applied Mathematics II	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UEE701 (Eng)	Research in Area of Specialization	3+0	4.5
UEE702 (Eng)	Research in Area of Specialization	3+0	4.5

PROGRAM IN ELECTRONICS (ENGILSH)

PROGRAM

I.Semester **II.Semester**

EEM507 (Eng)	Integrated Optical Waveguides	3+0	7.5	EEM547 (Eng)	Fundamentals of Detection and Estimation	3+0	7.5
	Seçmeli Dersler	--	22.5	EEM552 (Eng)	Micro-Nanodevices and Thin Film Applications	3+0	7.5
				EEM592 (Eng)	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				**IV.Semester**			
EEM790 (Eng)	Thesis	0+1	30.0	EEM790 (Eng)	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

EEM508 (Eng)	Reliability Analysis in Power System	3+0	7.5
EEM513 (Eng)	Network Security and BlockChain	3+0	7.5
EEM515 (Eng)	Dynamics of Electrical Machinery	3+0	7.5
EEM527 (Eng)	Advanced Power Electronics Circuits	3+0	7.5
EEM528 (Eng)	GPU Computing	3+0	7.5
EEM530 (Eng)	Hardware Security and Trusted Circuit Design	3+0	7.5
EEM534 (Eng)	Data-Communication Networks	3+0	7.5
EEM545 (Eng)	System Modeling	3+0	7.5
EEM546 (Eng)	Fundamentals of Robotics	3+0	7.5
EEM548 (Eng)	Power System Protection	3+0	7.5
EEM553 (Eng)	Digital Control Theory	3+0	7.5
EEM554 (Eng)	Nonlinear Control Systems	3+0	7.5
EEM561 (Eng)	Machine Vision	3+0	7.5
EEM564 (Eng)	Artificial Neural Networks	3+0	7.5
EEM565 (Eng)	Image Processing	3+0	7.5
EEM566 (Eng)	Pattern Recognition	3+0	7.5
EEM567 (Eng)	Advanced Computer Architecture	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MAT507 (Eng)	Applied Mathematics I	3+0	7.5
MAT508 (Eng)	Applied Mathematics II	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UEE701 (Eng)	Research in Area of Specialization	3+0	4.5
UEE702 (Eng)	Research in Area of Specialization	3+0	4.5

PROGRAM IN CONTROL SYSYTEMS (ENGILSH)

PROGRAM

	I.Semester				**II.Semester**		
EEM504 (Eng)	Random Variables and Stochastic Processes	3+0	7.5	EEM592 (Eng)	Seminar	3+0	7.5
EEM541 (Eng)	Linear Systems Theory I	3+0	7.5		*Seçmeli Dersler*	--	22.5
EEM551 (Eng)	Control Design Methods	3+0	7.5				
	Seçmeli Dersler	--	7.5				
			-----				-----
			30.0				30.0

III.Semester				**IV.Semester**			
EEM790 (Eng)	Thesis	0+1	30.0	EEM790 (Eng)	Thesis	0+1	30.0

		-----	-----
		30.0	30.0

Elective Courses

EEM508 (Eng)	Reliability Analysis in Power System	3+0	7.5
EEM513 (Eng)	Network Security and BlockChain	3+0	7.5
EEM515 (Eng)	Dynamics of Electrical Machinery	3+0	7.5
EEM527 (Eng)	Advanced Power Electronics Circuits	3+0	7.5
EEM528 (Eng)	GPU Computing	3+0	7.5
EEM530 (Eng)	Hardware Security and Trusted Circuit Design	3+0	7.5
EEM534 (Eng)	Data-Communication Networks	3+0	7.5
EEM545 (Eng)	System Modeling	3+0	7.5
EEM546 (Eng)	Fundamentals of Robotics	3+0	7.5
EEM548 (Eng)	Power System Protection	3+0	7.5
EEM553 (Eng)	Digital Control Theory	3+0	7.5
EEM554 (Eng)	Nonlinear Control Systems	3+0	7.5
EEM561 (Eng)	Machine Vision	3+0	7.5
EEM564 (Eng)	Artificial Neural Networks	3+0	7.5
EEM565 (Eng)	Image Processing	3+0	7.5
EEM566 (Eng)	Pattern Recognition	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MAT507 (Eng)	Applied Mathematics I	3+0	7.5
MAT508 (Eng)	Applied Mathematics II	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UEE701 (Eng)	Research in Area of Specialization	3+0	4.5
UEE702 (Eng)	Research in Area of Specialization	3+0	4.5

PROGRAM IN TELECOMMUNICATIONS (ENGILSH)

PROGRAM

I.Semester				II.Semester			
EEM504 (Eng)	Random Variables and Stochastic Processes	3+0	7.5	EEM547 (Eng)	Fundamentals of Detection and Estimation	3+0	7.5
	Seçmeli Dersler	--	22.5	EEM562 (Eng)	Signal Coding	3+0	7.5
				EEM592 (Eng)	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
EEM790 (Eng)	Thesis	0+1	30.0	EEM790 (Eng)	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

EEM508 (Eng)	Reliability Analysis in Power System	3+0	7.5
EEM513 (Eng)	Network Security and BlockChain	3+0	7.5
EEM515 (Eng)	Dynamics of Electrical Machinery	3+0	7.5
EEM527 (Eng)	Advanced Power Electronics Circuits	3+0	7.5
EEM528 (Eng)	GPU Computing	3+0	7.5
EEM530 (Eng)	Hardware Security and Trusted Circuit Design	3+0	7.5
EEM534 (Eng)	Data-Communication Networks	3+0	7.5
EEM545 (Eng)	System Modeling	3+0	7.5
EEM546 (Eng)	Fundamentals of Robotics	3+0	7.5

EEM548 (Eng)	Power System Protection	3+0	7.5
EEM553 (Eng)	Digital Control Theory	3+0	7.5
EEM554 (Eng)	Nonlinear Control Systems	3+0	7.5
EEM561 (Eng)	Machine Vision	3+0	7.5
EEM564 (Eng)	Artificial Neural Networks	3+0	7.5
EEM565 (Eng)	Image Processing	3+0	7.5
EEM566 (Eng)	Pattern Recognition	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MAT507 (Eng)	Applied Mathematics I	3+0	7.5
MAT508 (Eng)	Applied Mathematics II	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UEE701 (Eng)	Research in Area of Specialization	3+0	4.5
UEE702 (Eng)	Research in Area of Specialization	3+0	4.5

(NON-THESIS) MASTER OF SCIENCE (MS) DEGREE

PROGRAM IN CIRCUITS AND SYSTEMS THEORY (ENGLISH)

PROGRAM

I.Semester				II.Semester			
EEM504 (Eng)	Random Variables and Stochastic Processes	3+0	7.5	EEM599 (Eng)	Semester Project	3+0	0.0
EEM511 (Eng)	Introduction to Machine Learning	3+0	7.5		*Seçmeli Dersler*	--	30.0
EEM567 (Eng)	Advanced Computer Architecture	3+0	7.5				
	Seçmeli Dersler	--	7.5				
			-----				-----
			30.0				30.0

Elective Courses

EEM508 (Eng)	Reliability Analysis in Power System	3+0	7.5
EEM513 (Eng)	Network Security and BlockChain	3+0	7.5
EEM515 (Eng)	Dynamics of Electrical Machinery	3+0	7.5
EEM527 (Eng)	Advanced Power Electronics Circuits	3+0	7.5
EEM528 (Eng)	GPU Computing	3+0	7.5
EEM530 (Eng)	Hardware Security and Trusted Circuit Design	3+0	7.5
EEM534 (Eng)	Data-Communication Networks	3+0	7.5
EEM541 (Eng)	Linear Systems Theory I	3+0	7.5
EEM545 (Eng)	System Modeling	3+0	7.5
EEM546 (Eng)	Fundamentals of Robotics	3+0	7.5
EEM548 (Eng)	Power System Protection	3+0	7.5
EEM553 (Eng)	Digital Control Theory	3+0	7.5
EEM554 (Eng)	Nonlinear Control Systems	3+0	7.5
EEM561 (Eng)	Machine Vision	3+0	7.5
EEM564 (Eng)	Artificial Neural Networks	3+0	7.5
EEM565 (Eng)	Image Processing	3+0	7.5
EEM566 (Eng)	Pattern Recognition	3+0	7.5
MAT507 (Eng)	Applied Mathematics I	3+0	7.5
MAT508 (Eng)	Applied Mathematics II	3+0	7.5

PROGRAM IN ELECTRICAL MACHINERY (ENGILSH)

PROGRAM

I.Semester				II.Semester			
EEM501 (Eng)	Advanced Power System Analysis and Smart Grids	3+0	7.5	EEM549 (Eng)	Advanced Electrical Machinery	3+0	7.5
EEM504 (Eng)	Random Variables and Stochastic Processes	3+0	7.5	EEM599 (Eng)	Semester Project	3+0	0.0
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	22.5
			-----				-----
			30.0				30.0

Elective Courses

EEM508 (Eng)	Reliability Analysis in Power System	3+0	7.5
EEM513 (Eng)	Network Security and BlockChain	3+0	7.5
EEM515 (Eng)	Dynamics of Electrical Machinery	3+0	7.5
EEM527 (Eng)	Advanced Power Electronics Circuits	3+0	7.5
EEM528 (Eng)	GPU Computing	3+0	7.5
EEM530 (Eng)	Hardware Security and Trusted Circuit Design	3+0	7.5
EEM534 (Eng)	Data-Communication Networks	3+0	7.5
EEM541 (Eng)	Linear Systems Theory I	3+0	7.5
EEM545 (Eng)	System Modeling	3+0	7.5
EEM546 (Eng)	Fundamentals of Robotics	3+0	7.5
EEM548 (Eng)	Power System Protection	3+0	7.5
EEM553 (Eng)	Digital Control Theory	3+0	7.5
EEM554 (Eng)	Nonlinear Control Systems	3+0	7.5
EEM561 (Eng)	Machine Vision	3+0	7.5
EEM564 (Eng)	Artificial Neural Networks	3+0	7.5
EEM565 (Eng)	Image Processing	3+0	7.5
EEM566 (Eng)	Pattern Recognition	3+0	7.5
MAT507 (Eng)	Applied Mathematics I	3+0	7.5
MAT508 (Eng)	Applied Mathematics II	3+0	7.5

PROGRAM IN ELECTRICAL INSTALLATION SYSTEMS (ENGILSH)

PROGRAM

I.Semester				II.Semester			
EEM501 (Eng)	Advanced Power System Analysis and Smart Grids	3+0	7.5	EEM547 (Eng)	Fundamentals of Detection and Estimation	3+0	7.5
	Seçmeli Dersler	--	22.5	EEM549 (Eng)	Advanced Electrical Machinery	3+0	7.5
				EEM599 (Eng)	Semester Project	3+0	0.0
					Seçmeli Dersler	--	15.0
			-----				-----
			30.0				30.0

Elective Courses

EEM504 (Eng)	Random Variables and Stochastic Processes	3+0	7.5
EEM508 (Eng)	Reliability Analysis in Power System	3+0	7.5
EEM513 (Eng)	Network Security and BlockChain	3+0	7.5
EEM515 (Eng)	Dynamics of Electrical Machinery	3+0	7.5
EEM527 (Eng)	Advanced Power Electronics Circuits	3+0	7.5
EEM528 (Eng)	GPU Computing	3+0	7.5
EEM530 (Eng)	Hardware Security and Trusted Circuit Design	3+0	7.5
EEM534 (Eng)	Data-Communication Networks	3+0	7.5
EEM545 (Eng)	System Modeling	3+0	7.5

EEM546 (Eng)	Fundamentals of Robotics	3+0	7.5
EEM548 (Eng)	Power System Protection	3+0	7.5
EEM553 (Eng)	Digital Control Theory	3+0	7.5
EEM554 (Eng)	Nonlinear Control Systems	3+0	7.5
EEM561 (Eng)	Machine Vision	3+0	7.5
EEM564 (Eng)	Artificial Neural Networks	3+0	7.5
EEM565 (Eng)	Image Processing	3+0	7.5
EEM566 (Eng)	Pattern Recognition	3+0	7.5
MAT507 (Eng)	Applied Mathematics I	3+0	7.5
MAT508 (Eng)	Applied Mathematics II	3+0	7.5

PROGRAM IN ELECTROMAGNETIC FIELDS AND MICROWAVE TECHNIQUE (ENGILSH)

PROGRAM

I.Semester				II.Semester			
EEM507 (Eng)	Integrated Optical Waveguides	3+0	7.5	EEM502 (Eng)	Antenna Engineering	3+0	7.5
EEM509 (Eng)	Radio Frequency and Microware Circuits	3+0	7.5	EEM599 (Eng)	Semester Project	3+0	0.0
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	22.5
			-----				-----
			30.0				30.0

Elective Courses

EEM508 (Eng)	Reliability Analysis in Power System	3+0	7.5
EEM513 (Eng)	Network Security and BlockChain	3+0	7.5
EEM515 (Eng)	Dynamics of Electrical Machinery	3+0	7.5
EEM527 (Eng)	Advanced Power Electronics Circuits	3+0	7.5
EEM528 (Eng)	GPU Computing	3+0	7.5
EEM530 (Eng)	Hardware Security and Trusted Circuit Design	3+0	7.5
EEM534 (Eng)	Data-Communication Networks	3+0	7.5
EEM545 (Eng)	System Modeling	3+0	7.5
EEM546 (Eng)	Fundamentals of Robotics	3+0	7.5
EEM548 (Eng)	Power System Protection	3+0	7.5
EEM553 (Eng)	Digital Control Theory	3+0	7.5
EEM554 (Eng)	Nonlinear Control Systems	3+0	7.5
EEM561 (Eng)	Machine Vision	3+0	7.5
EEM564 (Eng)	Artificial Neural Networks	3+0	7.5
EEM565 (Eng)	Image Processing	3+0	7.5
EEM566 (Eng)	Pattern Recognition	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
MAT507 (Eng)	Applied Mathematics I	3+0	7.5
MAT508 (Eng)	Applied Mathematics II	3+0	7.5

PROGRAM IN ELECTRONICS (ENGILSH)

PROGRAM

I.Semester				II.Semester			
EEM507 (Eng)	Integrated Optical Waveguides	3+0	7.5	EEM547 (Eng)	Fundamentals of Detection and Estimation	3+0	7.5
	Seçmeli Dersler	--	22.5	EEM552 (Eng)	Micro-Nanodevices and Thin Film Applications	3+0	7.5

				EEM599 (Eng)	Semester Project	3+0	0.0
					Seçmeli Dersler	--	15.0
			-----				-----
			30.0				30.0

Elective Courses

EEM508 (Eng)	Reliability Analysis in Power System	3+0	7.5
EEM513 (Eng)	Network Security and BlockChain	3+0	7.5
EEM515 (Eng)	Dynamics of Electrical Machinery	3+0	7.5
EEM527 (Eng)	Advanced Power Electronics Circuits	3+0	7.5
EEM528 (Eng)	GPU Computing	3+0	7.5
EEM530 (Eng)	Hardware Security and Trusted Circuit Design	3+0	7.5
EEM534 (Eng)	Data-Communication Networks	3+0	7.5
EEM545 (Eng)	System Modeling	3+0	7.5
EEM546 (Eng)	Fundamentals of Robotics	3+0	7.5
EEM548 (Eng)	Power System Protection	3+0	7.5
EEM553 (Eng)	Digital Control Theory	3+0	7.5
EEM554 (Eng)	Nonlinear Control Systems	3+0	7.5
EEM561 (Eng)	Machine Vision	3+0	7.5
EEM564 (Eng)	Artificial Neural Networks	3+0	7.5
EEM565 (Eng)	Image Processing	3+0	7.5
EEM566 (Eng)	Pattern Recognition	3+0	7.5
EEM567 (Eng)	Advanced Computer Architecture	3+0	7.5
MAT507 (Eng)	Applied Mathematics I	3+0	7.5
MAT508 (Eng)	Applied Mathematics II	3+0	7.5

PROGRAM IN CONTROL SYSTEMS (ENGILSH)

PROGRAM

I.Semester				II.Semester			
EEM504 (Eng)	Random Variables and Stochastic Processes	3+0	7.5	EEM599 (Eng)	Semester Project	3+0	0.0
EEM541 (Eng)	Linear Systems Theory I	3+0	7.5		*Seçmeli Dersler*	--	30.0
EEM551 (Eng)	Control Design Methods	3+0	7.5				
	Seçmeli Dersler	--	7.5				
			-----				-----
			30.0				30.0

Elective Courses

EEM508 (Eng)	Reliability Analysis in Power System	3+0	7.5
EEM513 (Eng)	Network Security and BlockChain	3+0	7.5
EEM515 (Eng)	Dynamics of Electrical Machinery	3+0	7.5
EEM527 (Eng)	Advanced Power Electronics Circuits	3+0	7.5
EEM528 (Eng)	GPU Computing	3+0	7.5
EEM530 (Eng)	Hardware Security and Trusted Circuit Design	3+0	7.5
EEM534 (Eng)	Data-Communication Networks	3+0	7.5
EEM545 (Eng)	System Modeling	3+0	7.5
EEM546 (Eng)	Fundamentals of Robotics	3+0	7.5
EEM548 (Eng)	Power System Protection	3+0	7.5
EEM553 (Eng)	Digital Control Theory	3+0	7.5
EEM554 (Eng)	Nonlinear Control Systems	3+0	7.5
EEM561 (Eng)	Machine Vision	3+0	7.5
EEM564 (Eng)	Artificial Neural Networks	3+0	7.5
EEM565 (Eng)	Image Processing	3+0	7.5
EEM566 (Eng)	Pattern Recognition	3+0	7.5

MAT507 (Eng)	Applied Mathematics I	3+0	7.5
MAT508 (Eng)	Applied Mathematics II	3+0	7.5

PROGRAM IN TELECOMMUNICATIONS (ENGILSH)

PROGRAM

I.Semester				II.Semester			
EEM504 (Eng)	Random Variables and Stochastic Processes	3+0	7.5	EEM547 (Eng)	Fundamentals of Detection and Estimation	3+0	7.5
	Seçmeli Dersler	--	22.5	EEM562 (Eng)	Signal Coding	3+0	7.5
				EEM599 (Eng)	Semester Project	3+0	0.0
					Seçmeli Dersler	--	15.0
			-----				-----
			30.0				30.0

Elective Courses

EEM508 (Eng)	Reliability Analysis in Power System	3+0	7.5
EEM513 (Eng)	Network Security and BlockChain	3+0	7.5
EEM515 (Eng)	Dynamics of Electrical Machinery	3+0	7.5
EEM527 (Eng)	Advanced Power Electronics Circuits	3+0	7.5
EEM528 (Eng)	GPU Computing	3+0	7.5
EEM530 (Eng)	Hardware Security and Trusted Circuit Design	3+0	7.5
EEM534 (Eng)	Data-Communication Networks	3+0	7.5
EEM545 (Eng)	System Modeling	3+0	7.5
EEM546 (Eng)	Fundamentals of Robotics	3+0	7.5
EEM548 (Eng)	Power System Protection	3+0	7.5
EEM553 (Eng)	Digital Control Theory	3+0	7.5
EEM554 (Eng)	Nonlinear Control Systems	3+0	7.5
EEM561 (Eng)	Machine Vision	3+0	7.5
EEM564 (Eng)	Artificial Neural Networks	3+0	7.5
EEM565 (Eng)	Image Processing	3+0	7.5
EEM566 (Eng)	Pattern Recognition	3+0	7.5
MAT507 (Eng)	Applied Mathematics I	3+0	7.5
MAT508 (Eng)	Applied Mathematics II	3+0	7.5

DEPARTMENT OF INDUSTRIAL ENGINEERING

Head : Prof.Dr. Gürkan ÖZTÜRK

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester				II.Semester			
Seçmeli Dersler	- -	30.0	ENM692	Seminar	3+0	7.5
				Seçmeli Dersler	--	22.5
		-----				-----

			30.0				30.0
	III.Semester				**IV.Semester**		
DYS000	Qualifying Exam	0+0	0.0	ENM890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0
	V.Semester				**VI.Semester**		
ENM890	Thesis	0+1	30.0	ENM890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0
	VII.Semester				**VIII.Semester**		
ENM890	Thesis	0+1	30.0	ENM890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

ENM601	Introduction to Convex Analysis	3+0	7.5
ENM602	Stochastic Analysis	3+0	7.5
ENM603	Unconstrained Optimization	3+0	7.5
ENM604	Constrained Optimization	3+0	7.5
ENM605	Operations Research in Healthcare	3+0	7.5
ENM606	Multi-Objective Optimization	3+0	7.5
ENM608	Fuzzy Sets and Systems	3+0	7.5
ENM610	Finance Engineering	3+0	7.5
ENM612	Data Mining with Mathematical Programming	3+0	7.5
ENM614	Material Handling and Warehousing Systems	3+0	7.5
ENM616	Ergonomics and Occupational Biomechanics	3+0	7.5
ENM618	Advanced Techniques in Simulation	3+0	7.5
ENM620	Heuristics and Matheuristics in Operations Research	3+0	7.5
ENM627	Dynamic Programming	3+0	7.5
ENM629	Mathematical Statistics	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
LOJ601	Logistics Planning and Modelling	3+0	7.5
MAT631	Mathematics for Operations Research	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UEN901	Research in Area of Specialization	5+0	7.5
UEN902	Research in Area of Specialization	5+0	7.5

MASTER OF ARTS (MA) DEGREE

PROGRAM

	I.Semester				**II.Semester**		
ENM503	Advanced Techniques in Linear Programming	3+0	7.5	ENM502	Production Management Systems	3+0	7.5
	Seçmeli Dersler	--	22.5	ENM592	Seminar	3+0	7.5
				İST522	Stochastic Processes	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
ENM790	Thesis	0+1	30.0	ENM790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

ENM501	Design and Analysis of Experiments	3+0	7.5
ENM504	Decision Making Methods	3+0	7.5
ENM505	Sequencing and Scheduling	3+0	7.5
ENM508	Reliability of Systems	3+0	7.5
ENM509	Supply Chain Management	3+0	7.5
ENM512	Research Techniques in Human Engineering	3+0	7.5
ENM514	Mathematical Programming	3+0	7.5
ENM515	Energy Systems	3+0	7.5
ENM516	Multi Criteria Decision Making	3+0	7.5
ENM517	Special Topics in Facilities Planning	3+0	7.5
ENM518	Metaheuristics	3+0	7.5
ENM519	Strategic Choice and Planning in International and National Contex	3+0	7.5
ENM520	Advanced Management Technics	3+0	7.5
ENM521	Advanced Production Systems	3+0	7.5
ENM522	Multivariate Statistics,Application Tools and Techniques	3+0	7.5
ENM523	Introduction to Mathematical Optimization	3+0	7.5
ENM524	Predicting with Machine Learning	3+0	7.5
ENM525	Modeling and Analysis of Time Series Using R	1+2	7.5
ENM527	Logistics Modeling and Optimization	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MAT515	Engineering Mathematics	3+0	9.0
TAÇ701	Thesis Research Study Course	3+0	7.5
UEN701	Research in Area of Specialization	3+0	4.5
UEN702	Research in Area of Specialization	3+0	4.5

(NON-THESIS) MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
ENM503	Advanced Techniques in Linear Programming	3+0	7.5	ENM502	Production Management Systems	3+0	7.5
	Seçmeli Dersler	--	22.5	ENM599	Term Project	3+0	0.0
				İST522	Stochastic Processes	3+0	7.5
					Seçmeli Dersler	--	15.0
			-----				-----
			30.0				30.0

Elective Courses

ENM501	Design and Analysis of Experiments	3+0	7.5
ENM504	Decision Making Methods	3+0	7.5
ENM505	Sequencing and Scheduling	3+0	7.5
ENM508	Reliability of Systems	3+0	7.5
ENM509	Supply Chain Management	3+0	7.5
ENM512	Research Techniques in Human Engineering	3+0	7.5
ENM514	Mathematical Programming	3+0	7.5
ENM515	Energy Systems	3+0	7.5
ENM516	Multi Criteria Decision Making	3+0	7.5
ENM517	Special Topics in Facilities Planning	3+0	7.5
ENM518	Metaheuristics	3+0	7.5
ENM519	Strategic Choice and Planning in International and National Contex	3+0	7.5

ENM520	Advanced Management Technics	3+0	7.5
ENM521	Advanced Production Systems	3+0	7.5
ENM522	Multivariate Statistics,Application Tools and Techniques	3+0	7.5
ENM523	Introduction to Mathematical Optimization	3+0	7.5
ENM524	Predicting with Machine Learning	3+0	7.5
ENM525	Modeling and Analysis of Time Series Using R	1+2	7.5
ENM527	Logistics Modeling and Optimization	3+0	7.5
MAT515	Engineering Mathematics	3+0	9.0

DEPARTMENT OF INDUSTRIAL ARTS

Head : Prof.Dr. Nilay ERTÜRK

MASTER OF SCIENCE (MS) DEGREE

PROGRAM IN INDUSTRIAL DESIGN

In globalized world, concept of Industrial design gets an important place in production, while products get importance both in function and in aesthetic by increasing competition in markets. Definition of industrial design, which is designing and making visual and functional definition of every mass produced products, emphasizes the place of this science in industrial field. In Industrial Design Department; which established in 2000; computer aided design education which is a requirement of contemporary design education, is supported by softwares which are products of latest technology. Design studios, computer laboratories and workshops supply transition from theory to application. Students graduated from Industrial Design Department get the title of INDUSTRIAL DESİGNER. They can work as freelance designers and as designers in firms and government establishments' research and development departments and also in design studios.

PROGRAM

I.Semester				II.Semester			
ENT501	Industrial Design I	3+0	7.5	ENT502	Industrial Design II	3+0	7.5
ENT531	Design Research Methods	3+0	7.5	ENT510	New Approaches in Design	3+0	7.5
	Seçmeli Dersler	--	15.0	ENT592	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
ENT790	Thesis	0+1	30.0	ENT790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

ARY505	Scientific Research Planning and Evaluation	3+0	7.5
ENT503	Design Management	3+0	7.5
ENT504	Portfolio Presentation Techniques	3+0	7.5
ENT506	Media and Design	3+0	7.5
ENT507	Quality in Industrial Design	3+0	7.5
ENT508	Product Identity	3+0	7.5
ENT509	Cultural Problems	3+0	7.5
ENT511	Advanced Computer Aided Manufacturing	3+0	7.5
ENT512	Role of Sector in Product Development	2+2	7.5
ENT513	Creation of Brand and Market Strategies	3+0	7.5
ENT514	Theory and Origins of Sustainable Design	3+0	7.5
ENT515	Technical Analysis in Design	3+0	7.5

ENT516	Form and Meaning in Product Design	3+0	7.5
ENT518	Remote Design Research	3+0	7.5
ENT519	Advanced Presentation Techniques I	2+2	7.5
ENT520	Advanced Presentation Techniques II	2+2	7.5
ENT521	Computer Aided Design I	2+2	7.5
ENT522	Computer Aided Design II	2+2	7.5
ENT523	Visualisation	3+0	7.5
ENT525	Advanced Computer Aided Industrial Design I	2+2	7.5
ENT526	Advanced Computer Aided Industrial Design II	2+2	7.5
ENT527	Automotive Industry and Design	3+0	7.5
ENT528	Sustainable Design Practice	3+0	7.5
ENT529	Ocular Culture and Design Thinking	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UET701	Research in Area of Specialization	3+0	4.5
UET702	Research in Area of Specialization	3+0	4.5

PROGRAM IN FASHION DESIGN

PROGRAM

I.Semester				II.Semester			
MOD513	Advanced Projects in Fashion Design I	2+2	7.5	ENT592	Seminar	3+0	7.5
	Seçmeli Dersler	--	22.5	MOD523	Philosophy of Design	3+0	7.5
				MOD529	Culturel Approaches in Fashion Design	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
ENT790	Thesis	0+1	30.0	ENT790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

ARY505	Scientific Research Planning and Evaluation	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MOD501	Pattern Design in Textile	3+0	7.5
MOD510	Fashion Concept in Design	3+0	7.5
MOD511	Intelligent Textiles and Clothing	3+0	7.5
MOD512	Art and Design	2+2	7.5
MOD514	Advanced Projects in Fashion Design II	2+2	7.5
MOD515	Fashion Design Presentation and Graphic Design Relation	3+0	7.5
MOD516	The Quest for a Form in Fashion Design	2+1	7.5
MOD517	Design, Art and Fashion Relationship	3+0	7.5
MOD518	Computer Based Technologies for Textile and Print Design Simulation	3+0	7.5
MOD519	New Approaches to Design of Fashion Accessories	3+0	7.5
MOD520	Experimental Draping	1+2	7.5
MOD521	Fiber Art I	3+0	7.5
MOD522	Fiber Art II	3+0	7.5
MOD524	Applied Studies on Natural Dyeing	2+1	7.5
MOD525	Experimental Printing Design	3+0	7.5
MOD527	Wearable Art	1+2	7.5
MOD531	Textile Surface Aplications in Wearable Art	1+2	7.5
MOD533	Garment Comfort	3+0	7.5

TAÇ701	Thesis Research Study Course	3+0	7.5
UET701	Research in Area of Specialization	3+0	4.5
UET702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF PHYSICS

Head : Prof.Dr. Abidin KILIÇ

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester					II.Semester		
Seçmeli Dersler	-	30.0	FİZ692		Seminar	3+0	7.5
	-				*Seçmeli Dersler*	--	22.5
		-----					-----
		30.0					30.0

III.Semester					IV.Semester		
DYS000	Qualifying Exam	0+0	0.0	FİZ890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

V.Semester					VI.Semester		
FİZ890	Thesis	0+1	30.0	FİZ890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

VII.Semester					VIII.Semester		
FİZ890	Thesis	0+1	30.0	FİZ890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
FİZ601	Clay and Clay Minerals I	3+0	7.5
FİZ602	Clay and Clay Minerals II	3+0	7.5
FİZ604	Selected Topics in Zeolite Molecular Sieves	3+0	7.5
FİZ605	Selected Topics on Clay and Clay Minerals I	3+0	7.5
FİZ606	Selected Topics in Electromagnetic Wave Theory	3+0	7.5
FİZ607	Optical Properties of Semiconductors I	3+0	7.5
FİZ608	Optical Properties of Semiconductors II	3+0	7.5
FİZ610	Selected Topics on Clay and Clay Minerals II	3+0	7.5
FİZ611	Selected Topics in Solid State Physics	3+0	7.5
FİZ612	Dielectric Physics	3+0	7.5
FİZ614	Selected Topics in Classical Mechanics	3+0	7.5
FİZ616	Group Theory and Applications to Physics	3+0	7.5
FİZ617	Lie Groups and Physical Applications	3+0	7.5
FİZ619	Conduction Mechanisms in Solids	3+0	7.5

FİZ621	Selected Topics in Adsorption Technology	3+0	7.5
FİZ622	Selected Topics of Advanced Statistical Physics	3+0	7.5
FİZ623	Selected Topics in Mathematical Physics	3+0	7.5
FİZ624	Selected Topics in Semiconductors	3+0	7.5
FİZ627	Selected Topics in Ion Exchange	3+0	7.5
FİZ629	Electromagnetic Wave Theory	3+0	7.5
FİZ630	Magnetic Properties of Solids	3+0	7.5
FİZ631	Organic Semiconductor Physics	3+0	7.5
FİZ632	Classical Electrodynamics	3+0	7.5
FİZ633	Band Theory in Semiconductors	3+0	7.5
FİZ634	Gravitation and Cosmology	3+0	7.5
FİZ635	Ultra Cold Atomic Gases	3+0	7.5
FİZ636	Molecular Beam Epitaxy: Instrument and Application	3+0	7.5
FİZ637	Fundamental Properties and Gas Adsorption Applications of Naturel Adsorbents	3+0	7.5
FİZ638	Fundamentals of Semiconductor Device and Technology	3+0	7.5
FİZ639	Physical Mechanisms of Variables Stars	3+0	7.5
FİZ640	Structural Properties of Accretion Disc in Binary Stars	3+0	7.5
FİZ641	Gas Adsorption Applications of Clay Type Naturel Adsorbents	3+0	7.5
FİZ642	Infrared and Raman Spectroscopy	3+0	7.5
FİZ643	Matrix Isolation Techniques and Applications	3+0	7.5
FİZ644	Nuclear Magnetic Resonance Spectroscopy	3+0	7.5
FİZ645	Semiconductor Device Technology	3+0	7.5
FİZ646	Principles of Plasma Discharges	3+0	7.5
FİZ647	Natural Zeolites	3+0	7.5
FİZ652	Recommended Course Content	3+0	7.5
FİZ658 (Eng)	Characterization of Porous Materials	3+0	7.5
FİZ658	Characterization of Porous Materials	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UFZ901	Research in Area of Specialization	5+0	7.5
UFZ902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
FİZ501	Mathematical Physics	3+0	7.5	FİZ508	Quantum Mechanics	3+0	7.5
	Seçmeli Dersler	--	22.5	FİZ542	Electromagnetic Theory	3+0	7.5
				FİZ592	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
FİZ790	Thesis	0+1	30.0	FİZ790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
FİZ503	Ion Exchange	3+0	7.5
FİZ505	Physical Adsorption	3+0	7.5
FİZ507	Quantum Mechanics and Molecular Spectroscopy	3+0	7.5
FİZ509	Instrumental Analysis Methods	3+0	7.5
FİZ510	Evolution of Stars	3+0	7.5

FİZ512	High Energy Astrophysics	3+0	7.5
FİZ514	Electromagnetic Wave Theory	3+0	7.5
FİZ515	Analysis of the X-ray Spectrum	3+0	7.5
FİZ522	Geometric Algebra and Applications	3+0	7.5
FİZ523	Optoelectronic Physics I	3+0	7.5
FİZ524	Optoelectronic Physics II	3+0	7.5
FİZ525	Some Biophysical Techniques Connected With Waves	3+0	7.5
FİZ526	Classical Mechanics	3+0	7.5
FİZ527	Advanced Statistical Physics	3+0	7.5
FİZ528	Adsorption Technology	3+0	7.5
FİZ529	Thin Film Characterization	3+0	7.5
FİZ530	Thin Film Technology	3+0	7.5
FİZ531	Amorphous Material Physics	3+0	7.5
FİZ532	Particle Physics	3+0	7.5
FİZ533	Special Function in Physics I	3+0	7.5
FİZ537	Fundamentals of Impedance Spectroscopy	3+0	7.5
FİZ538	Special Functions in Physics II	3+0	7.5
FİZ539	Dynamics and Relativity	3+0	7.5
FİZ540	Characterization of Solids	3+0	7.5
FİZ541	Semiconductors	3+0	7.5
FİZ543	Condensed Matter Physics I	3+0	7.5
FİZ544	Condensed Matter Physics II	3+0	7.5
FİZ545	Characterization Methods of Porous Solids and Powder Minerals	3+0	7.5
FİZ546	Infrared Detection Systems: Physics and Technology	3+0	7.5
FİZ547	Lab VIEW: Graphical Programming Language	3+0	7.5
FİZ549	Hypercomplex Numbers in Physics	3+0	7.5
FİZ550	Geometry and Topology in Physics	3+0	7.5
FİZ551	Plasma Physics	3+0	7.5
FİZ553	Molecular Modelling	3+0	7.5
FİZ554	Surfactants in Aqueous Solutions	3+0	7.5
FİZ556	Experimental Techniques in Particle Physics	3+0	7.5
FİZ557	Radiation Physics	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UFZ701	Research in Area of Specialization	3+0	4.5
UFZ702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF INTERDISCIPLINARY MOVEMENT AND TRAINING SCIENCES

Head : Prof.Dr. Hayri ERTAN

DOCTORATE DEGREE (PH.D)

PROGRAM

	I.Semester					II.Semester		
	Seçmeli Dersler	-	30.0	HAB692		Seminar	3+0	7.5
		-				*Seçmeli Dersler*	--	22.5
			-----					-----
			30.0					30.0
	III.Semester					**IV.Semester**		
DYS000	Qualifying Exam	0+0	0.0	HAB890-0		Thesis (Thesis Proposal)	0+1	30.0

			---				-----
			--				
							30.0

V.Semester				VI.Semester			
HAB890	Thesis	0+1	30.0	HAB890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

VII.Semester				VIII.Semester			
HAB890	Thesis	0+1	30.0	HAB890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

BES533	Introduction to Research Methods and Technics in Sports	3+0	7.5
BES566	Practical Application to the Study of VO2 Kinetics	2+1	7.5
BES607	Sports for the Disabled	3+0	7.5
BES612	Neuromuscular Adaptation and Fatigue	3+0	7.5
BES616	Medical Subjects in Sports and Health Organizations for Athletes	3+0	7.5
BES619	Training Theory I	3+0	7.5
BES620	Training Theory II	3+0	7.5
BES626	Contemporary Approaches in Sport and Exercise Psychology	3+0	7.5
BES627	Social Psychology of Sport	3+0	7.5
BES628	Arousal Theories in Sport	3+0	7.5
BES630	Exercise Approaches for Special Groups	3+0	7.5
BES632	In Biological Systems Methods of Analysis of Reactive Oxygen Species	3+0	7.5
BES633	Exercise Prescription	3+0	7.5
BES635	Anti-Aging and Exercise	3+0	7.5
BES636	Pedobarographic Applications During Various Motor Tasks	2+1	7.5
BES638	Sportive Technical Analysis Applications	2+1	7.5
BES646	Global Positioning System (GPS) and Sport Specific Testing	1+2	7.5
BES649	Performance Monitoring in Sport	2+1	7.5
BES651	Training Load Monitorization and Field Test in Team Sports	1+2	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
HAB622	Oxidative Stress Responses to Aerobic Exercise	3+0	7.5
HAB623	Oxidative Stress Responses To Resistance Exercise	3+0	7.5
HAB624	Muscle Damage Paradigm	3+0	7.5
HAB625	Physiological Basis Of Human Performance	3+0	7.5
HAB626	Fundamental Of High-Lovel Performance	3+0	7.5
HAB627	Training Perıodızatıon	3+0	7.5
HAB629	Advanced Anatomy in Sports	3+0	7.5
HAB630	Adaptation to Strength Training	3+0	7.5
HAB632	Biostatistics	3+0	7.5
HAB633	Training Theory I	3+0	7.5
HAB634	Adaptation to Strength Training	3+0	7.5
HAB635	Exercise Prescription	3+0	7.5
HAB636	Training Theory II	3+0	7.5
HAB637	Anti Aging and Exercise	3+0	7.5
HAB638	Exercise Approaches for Special Groups	3+0	7.5
HAB639	Performance Monitoring in Sport	2+1	7.5
HAB640	Sportive Technical Analysis Applications	2+1	7.5
HAB641	Biomechanics of Musculoskeletal System I	3+0	7.5
HAB642	Global Positioning System (GPS) and Sport Specific Testing	3+0	7.5
HAB643	Neuromuscular Adaptation and Fatigue	3+0	7.5
HAB644	Biomechanics of Musculoskeletal System II	3+0	7.5
HAB645	Training Load Monitorization and Field Test in Team Sports	1+2	7.5
HAB646	Electromyography Signal Processing	3+0	7.5
HAB901	Research in Area of Specialization	5+0	7.5
HAB902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
BES533	Introduction to Research Methods and Technics in Sports	3+0	7.5	HAB521	Academic Writing Skills I	3+0	7.5
İST543	Statistics I	3+0	7.5	HAB592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			30.0				30.0

III.Semester				IV.Semester			
HAB790	Thesis	0+1	30.0	HAB790	Thesis	0+1	30.0
			30.0				30.0

Elective Courses

ANA501	Functional Anatomy	3+0	7.5
ANA503	Physiology I	3+0	7.5
ANA504	Physiology II	3+0	7.5
BES504	Sport Medicine	3+0	7.5
BES505	Protection Sport Accidents and Treatment Approaches	3+0	7.5
BES508	Exercise Physiology	3+0	7.5
BES517	Sport Physiology	3+0	7.5
BES518	Physical Appropriateness	3+0	7.5
BES520	Experimental Applications in Sportive Performance	3+0	7.5
BES522	Experimental Approach to Exercise Neurophysiology	3+0	7.5
BES526	Motivational Orientations in Sport	3+0	7.5
BES531	Exercise and Sport Psychology	3+0	7.5
BES535	Movement Science and Performance Training	3+0	7.5
BES536	Evaluation of Physical and Motor Fitness in School	2+1	7.5
BES539	Motor Control of Human Movement	3+0	7.5
BES540	Physical Activity and Health in Schools	3+0	7.5
BES555	Analysis of Sportive Technique	3+0	7.5
BES556	Training Periodization in Team Sports	3+0	7.5
BES557	Periodization Methodologies in Football	3+0	7.5
BES558	Current Approaches and Corrective Exercises in Fitness Applications	2+1	7.5
BES559	Match and Player Analysis in Team Sports	3+0	7.5
BES561	Introduction to Exercise Neurophysiology	3+0	7.5
BES565	Electrophysiological Training Methods in Sports	2+1	7.5
BES567	Oxygen Uptake Kinetics	2+1	7.5
BES569	Acute and Chronic Adaptation to Exercise at High Altitude	2+1	7.5
BES637	Exercise and Oxidative Stress	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
HAB522	High-İntensity Interval Training (HIIT) in Team Sports	3+0	7.5
HAB523	Academic Writing Skills II	3+0	7.5
HAB524	Talent Identification And Development In Sports	3+0	7.5
HAB526	Training Principles For Spine, Upper, and Lower Extremities	3+0	7.5
HAB527	Antioxidants and Athletics Performance	3+0	7.5
HAB528	Current Trends In Strength Training	3+0	7.5
HAB529	Scientific Fundamentals Of Training	3+0	7.5
HAB531	Body Composition and Performance	3+0	7.5
HAB532	Sports for Disability Persons	3+0	7.5
HAB533	Motivation in Sport	3+0	7.5
HAB534	Movement And Training Principles	3+0	7.5
HAB535	Functional Anatomy	3+0	7.5
HAB536	Experimental Approach to Exercise Neurophysiology	3+0	7.5
HAB537	Introduction to Exercise Neurophysiology	3+0	7.5

HAB538	The Fundamentals of Kinesiological Electromyography	3+0	7.5
HAB539	Physiology I	3+0	7.5
HAB540	Physiology II	3+0	7.5
HAB541	Physical Appropriateness	3+0	7.5
HAB542	Experimental Applications in Sportive Performance	3+0	7.5
HAB543	Talent and Talent Identification for Sports in Children	3+0	7.5
HAB544	Advanced Training Theory	3+0	7.5
HAB545	Basic Training Theory	3+0	7.5
HAB546	Monitoring Training and Performance in Athletes	3+0	7.5
HAB547	Movement Science and Performance Training	3+0	7.5
HAB548	Training Periodization in Team Sports	3+0	7.5
HAB549	Analysis of Sportive Technique	3+0	7.5
HAB550	Current Approaches and Corrective Exercises in Fitness Applications	2+1	7.5
HAB551	Periodization Methodologies in Football	3+0	7.5
HAB552	Practical Application to the Study of VO2 Kinetics	2+1	7.5
HAB553	Match and Player Analysis in Team Sports	3+0	7.5
HAB555	Electrophysiological Training Methods in Sports	2+1	7.5
HAB556	Physical Activity and Technology Use	3+0	7.5
HAB557	Oxygen Uptake Kinetics	2+1	7.5
HAB559	Acute and Chronic Adaptation to Exercise at High Altitude	2+1	7.5
HAB561	Exercise and Oxidative Stress	3+0	7.5
HAB563	Current Literature in Movement and Training and Applied Project Development	2+1	7.5
HAB565	Physical Activity Recommendations and Assessment	3+0	7.5
HAB701	Research in Area of Specialization	3+0	4.5
HAB702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF AIR TRAFFIC CONTROL

Head : Assoc. Prof.Dr. Cem ÇETEK

DOCTORATE DEGREE (PH.D)

PROGRAM

	I.Semester				**II.Semester**		
	Seçmeli Dersler	- -	30.0	HTK692	Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
			-----				-----
			30.0				30.0
	III.Semester				**IV.Semester**		
DYS000	Qualifying Exam	0+0	0.0	HTK890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0
	V.Semester				**VI.Semester**		
HTK890	Thesis	0+1	30.0	HTK890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0
	VII.Semester				**VIII.Semester**		
HTK890	Thesis	0+1	30.0	HTK890	Thesis	0+1	30.0

			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
HTK601	Air Traffic Management and Aircraft Performance II	3+0	7.5
HTK603	Models and Simulation in Air Traffic Management II	3+0	7.5
HTK604	Aviation Safety Management Application	3+0	7.5
HTK605	New Concepts and Visions in Air Traffic	3+0	7.5
HTK606	Advanced Aircraft Controls and Navigation II	3+0	7.5
HTK607	Measuring of Quality and Costumer Satisfaction in Air Traffic Control Services	3+0	7.5
HTK609	Air Traffic Management and Environment	3+0	7.5
HTK610	Cost Analysis in Air Traffic Management	3+0	7.5
HTK611	Artificial Intelligence Applications in Air Traffic Control	3+0	7.5
HTK613	Universal Design in Air Traffic Control	3+0	7.5
HTK615	Critical Questioning in Air Traffic Control	3+0	7.5
SHA601	Airline Management	3+0	7.5
SHA602	Aircraft Dynamics	3+0	7.5
SHA608	Optimization Methods in Flight Mechanics	3+0	7.5
SHA614	Airport Design	3+0	7.5
SHA626	Genetic Algorithms and Applications of Control Systems	3+0	7.5
SHA628	Airspace Management	3+0	7.5
SHA632	Free Flight Concept and Analysis	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UHT901	Reseach in Area of Specialization	5+0	7.5
UHT902	Reseach in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
HTK501	Air Traffic Management and Aircraft Performance I	3+0	7.5	HTK502	Models and Simulation in Air Traffic Management I	3+0	7.5
	Seçmeli Dersler	--	22.5	HTK592	Seminar	3+0	7.5
				SHA538	Flight Procedures And Airspace Design	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
HTK790	Thesis	0+1	30.0	HTK790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
HTK504	Air Traffic Flow Management and Airspace Capacity Analysis	3+0	7.5
HTK505	Multi-Criteria Decision-Making	3+0	7.5
HTK506	Statistical Analysis for Air Traffic System	3+0	7.5
HTK507	Research Methods for Air Traffic System	3+0	7.5
HTK508	Human Factors in Air Traffic Control	3+0	7.5
HTK509	Real Time Simulation and Data Analysis in Air Traffic Control	3+0	7.5
HTK510	Advanced Aircraft Controls and Navigation I	3+0	7.5
HTK511	Air Traffic System and Evulation Criterion	3+0	7.5

HTK512	Performance Based Navigation and Design Methods	3+0	7.5
HTK513	Quantitative and Qalitative Research Methods in Air Traffic Control	3+0	7.5
HTK515	Human-Computer Interactin in Air Traffic Control	3+0	7.5
HTK517	Scientific Research Projects in Air Traffic Control	3+0	7.5
HTK519	Dynamic Airspace Management	3+0	7.5
HTK520	Air Traffic Management and Environmental Impacts	3+0	7.5
HTK521	System Analysis and Desing	3+0	7.5
HTK522	Airspace Capacity and Traffic Flow Optimization	3+0	7.5
HTK524	Use of Decision Models for the Solutions of Air Traffic Management Problems	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UHT701	Research in Area of Specialization	3+0	4.5
UHT702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF AIR TRAFFIC CONTROL

Head :

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester				II.Semester			
Seçmeli Dersler	- -	30.0		HTK692	Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
		-----					-----
		30.0					30.0

III.Semester					IV.Semester		
DYS000	Qualifying Exam	0+0	0.0	HTK890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

V.Semester					VI.Semester		
HTK890	Thesis	0+1	30.0	HTK890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

VII.Semester					VIII.Semester		
HTK890	Thesis	0+1	30.0	HTK890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
HTK601	Air Traffic Management and Aircraft Performance II	3+0	7.5
HTK603	Models and Simulation in Air Traffic Management II	3+0	7.5
HTK604	Aviation Safety Management Application	3+0	7.5
HTK605	New Concepts and Visions in Air Traffic	3+0	7.5
HTK606	Advanced Aircraft Controls and Navigation II	3+0	7.5
HTK607	Measuring of Quality and Costumer Satisfaction in Air Traffic Control Services	3+0	7.5

HTK609	Air Traffic Management and Environment	3+0	7.5
HTK610	Cost Analysis in Air Traffic Management	3+0	7.5
HTK611	Artificial Intelligence Applications in Air Traffic Control	3+0	7.5
HTK613	Universal Design in Air Traffic Control	3+0	7.5
SHA601	Airline Management	3+0	7.5
SHA602	Aircraft Dynamics	3+0	7.5
SHA608	Optimization Methods in Flight Mechanics	3+0	7.5
SHA614	Airport Design	3+0	7.5
SHA615	Advanced Mechanical Vibrations	3+0	7.5
SHA626	Genetic Algorithms and Applications of Control Systems	3+0	7.5
SHA628	Airspace Management	3+0	7.5
SHA632	Free Flight Concept and Analysis	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UHT901	Reseach in Area of Specialization	5+0	7.5
UHT902	Reseach in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
HTK501	Air Traffic Management and Aircraft Performance I	3+0	7.5	HTK502	Models and Simulation in Air Traffic Management I	3+0	7.5
	Seçmeli Dersler	--	22.5	HTK592	Seminar	3+0	7.5
				SHA538	Flight Procedures And Airspace Design	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
HTK790	Thesis	0+1	30.0	HTK790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
HTK504	Air Traffic Flow Management and Airspace Capacity Analysis	3+0	7.5
HTK505	Multi-Criteria Decision-Making	3+0	7.5
HTK506	Statistical Analysis for Air Traffic System	3+0	7.5
HTK507	Research Methods for Air Traffic System	3+0	7.5
HTK508	Human Factors in Air Traffic Control	3+0	7.5
HTK509	Real Time Simulation and Data Analysis in Air Traffic Control	3+0	7.5
HTK510	Advanced Aircraft Controls and Navigation I	3+0	7.5
HTK511	Air Traffic System and Evulation Criterion	3+0	7.5
HTK512	Performance Based Navigation and Design Methods	3+0	7.5
HTK513	Quantitative and Qalitative Research Methods in Air Traffic Control	3+0	7.5
HTK515	Human-Computer Interactin in Air Traffic Control	3+0	7.5
HTK517	Scientific Research Projects in Air Traffic Control	3+0	7.5
HTK519	Dynamic Airspace Management	3+0	7.5
HTK520	Air Traffic Management and Environmental Impacts	3+0	7.5
HTK521	System Analysis and Desing	3+0	7.5
HTK522	Airspace Capacity and Traffic Flow Optimization	3+0	7.5
HTK524	Use of Decision Models for the Solutions of Air Traffic Management Problems	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UHT701	Research in Area of Specialization	3+0	4.5
UHT702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF AVIONICS

Head : Prof.Dr. Hakan OKTAL

DOCTORATE DEGREE (PH.D)

PROGRAM

	I.Semester				II.Semester		
	Seçmeli Dersler	- -	30.0	HEE692	Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
			-----				-----
			30.0				30.0

	III.Semester				IV.Semester		
DYS000	Qualifying Exam	0+0	0.0	HEE890-0	Thesis (Thesis Proposal)	0+1	30.0
			--- --				-----
							30.0

	V.Semester				VI.Semester		
HEE890	Thesis	0+1	30.0	HEE890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

	VII.Semester				VIII.Semester		
HEE890	Thesis	0+1	30.0	HEE890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
HEE602	Signal Processing in Receivers of Satellite Based Navigation System	3+0	7.5
HEE610	Systems of Modern Gas Turbine Engines	3+0	7.5
HEE611	Space Propulsion Systems, Sensors and Instruments	3+0	7.5
HEE613	Soft Computing in Aviation	3+0	7.5
HEE615	Dielectric Properties of Polymer Materials	3+0	7.5
SHA601	Airline Management	3+0	7.5
SHA602	Aircraft Dynamics	3+0	7.5
SHA604	Engineering Economic Analysis	3+0	7.5
SHA608	Optimization Methods in Flight Mechanics	3+0	7.5
SHA614	Airport Design	3+0	7.5
SHA618	Fault Tolerant Flight Control System Design	3+0	7.5
SHA620	Aircraft Performance and Operational Analysis II	3+0	7.5
SHA626	Genetic Algorithms and Applications of Control Systems	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UHE901	Research in Area of Specialization	5+0	7.5
UHE902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
HEE501	Satellite Based Navigation Systems	3+0	7.5	HEE592	Seminar	3+0	7.5
SHA511	Aircraft Performance And Operation Analysis I	3+0	7.5	MAT517	Applied Mathematics	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

III.Semester				IV.Semester			
HEE790	Thesis	0+1	30.0	HEE790	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
HEE502	Sensors and Transducers	3+0	7.5
HEE511	Fundamental Measurement Methods in Aviation	3+0	7.5
HEE512	Aviation Applications with Matlab	3+0	7.5
HEE514	Fundamental Sensor Technologies	3+0	7.5
SHA524	Modern Control Systems	3+0	7.5
SHA525	CNS-ATM Systems	3+0	7.5
SHA536	Flight Control System Design	3+0	7.5
SHA545	Fuzzy Logic Applications in Aviation	3+0	7.5
SHA547	Flight Tests and Instrumentation	3+0	7.5
SHA554	Aviation Lighting Technics	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UHE701	Research in Area of Specialization	3+0	4.5
UHE702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF AVIATION MANAGEMENT

Head : Prof.Dr. Ferhan ŞENGÜR

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester				II.Semester			
Seçmeli Dersler	- -	30.0	SHY692	Seminar	3+0	7.5
				Yabancı Dil Dersleri	--	22.5
		---				---
		30.0				30.0

	III.Semester				IV.Semester		
DYS000	Qualifying Exam	0+0	0.0	SHY890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

	V.Semester				VI.Semester		
SHY890	Thesis	0+1	30.0	SHY890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

	VII.Semester				VIII.Semester		
SHY890	Thesis	0+1	30.0	SHY890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

ARY621	Structural Equation Modeling	3+0	7.5
ARY626	Qualitative Research Methods	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
PZL610	Consumer Behaviours	3+0	7.5
SHY516	Aviation Marketing Management	3+0	7.5
SHY609	Airport Planning	3+0	7.5
SHY610	Airport Operations and Management	3+0	7.5
SHY612	Corporate Strategies in Aviation Business	3+0	7.5
SHY613	Fleet Planning and Aircraft Selection Practices	3+0	7.5
SHY615	Current Marketing Practices Air Transportation	3+0	7.5
SHY617	Simulation and Applications in Aviation	3+0	7.5
SHY619	Digital Transformation in Aviation	3+0	7.5
SHY620	Human Resources Applications in Aviation	3+0	7.5
SHY621	Airline Cost Analysis	3+0	7.5
SHY622	Airline Management Strategies	3+0	7.5
SHY623	Micro Organization Theory and Aviation Practices I	3+0	7.5
SHY624	Organization Theory and Applications in Aviatio	3+0	7.5
SHY625	Power and Politics in Organization Theories: Applications to Aviation	3+0	7.5
SHY626	Change Management in Aviation	3+0	7.5
SHY628	Micro Organization Theory and Applications in Aviation	3+0	7.5
SHY630	Micro Organization Theory and Aviation Practices II	3+0	7.5
SHY632	Airline Marketing Strategies	3+0	7.5
SHY634	Strategic HR Management and Aviation Applications	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
USH901	Research in Area of Specialization	5+0	7.5
USH902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

	I.Semester				II.Semester		
ARY535	Quantitative Research Methods	3+0	7.5	ARY524	Qualitative Research Design	3+0	7.5
SHY540	Air Transportation Management	3+0	7.5	SHY592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----

			30.0				30.0
	III.Semester				**IV.Semester**		
SHY790	Thesis	0+1	30.0	SHY790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
SHY517	Aviation Safety Management	3+0	7.5
SHY527	Air Transportation Economics	3+0	7.5
SHY529	Cost Management in Aviation Companies	3+0	7.5
SHY531	Crisis and Risk Management in Aviation	3+0	7.5
SHY534	Service Marketing in Airline Industry	3+0	7.5
SHY536	Aviation and The Environment	3+0	7.5
SHY538	Case Studies in Aviation Management	3+0	7.5
SHY541	Marketing Management in Airlines	3+0	7.5
SHY542	Financing Applications in Air Transportation	3+0	7.5
SHY544	Airport Safety, Operations and Management	3+0	7.5
SHY545	Operations Management in Aviation	3+0	7.5
SHY546	Management and Leadership	3+0	7.5
SHY547	Supply Chain Management in Aviation	3+0	7.5
SHY549	Strategic Management and Planning in Aviation	3+0	7.5
SHY551	Contemporary Approaches to Management	3+0	7.5
SHY555	Sustainability in Aviation Businesses	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
USH701	Research in Area of Specialization	3+0	4.5
USH702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF INTERIOR ARCHITECTURE

Head :

PROFICIENCY IN ARTS

PROGRAM

	I.Semester				**II.Semester**		
İÇT601	Design Researches Workshop I	3+0	7.5	İÇT602	Design Researches Workshop II	3+0	7.5
	Seçmeli Dersler	--	22.5	İÇT692	Seminar	3+0	7.5
					Seçmeli Dersler	--	15.0
			-----				-----
			30.0				30.0
	III.Semester				**IV.Semester**		
DYS000	Qualifying Exam	0+0	0.0	İÇT890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0
	V.Semester				**VI.Semester**		

İÇT890	Thesis	0+1	30.0	İÇT890	Thesis	0+1	30.0
			---				---
			30.0				30.0

	VII.Semester				**VIII.Semester**		
İÇT890	Thesis	0+1	30.0	İÇT890	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
İÇT603	Spatial Relationships and Interfaces	3+0	7.5
İÇT605	Globalisation, Identity and Design	3+0	7.5
İÇT606	Aesthetic Criticism on Interior Design	3+0	7.5
İÇT607	Earthquake Security and Space Design	3+0	7.5
İÇT609	Analytical Approach on Interior Design	3+0	7.5
İÇT611	Consumption and Design	3+0	7.5
İÇT612	Formation of Determination of Semantic Quality in Interiors	3+0	7.5
İÇT613	New Museology-Cultural Heritage and Museum Space Design	3+0	7.5
İÇT615	Lighting Design and Technology	3+0	7.5
İÇT616	Bending Furniture Design and Manufacturing Technology	3+0	7.5
İÇT621	Housing and Changing Boundaries of the House	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
Uİç901	Research in Area of Specialization	5+0	7.5
Uİç902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

	I.Semester				**II.Semester**		
İÇT513	Design Studio I	3+0	7.5	İÇT514	Design Studio II	3+0	7.5
İÇT529	Design Studies	3+0	7.5	İÇT592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

	III.Semester				**IV.Semester**		
İÇT790	Thesis	0+1	30.0	İÇT790	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
İÇT503	Design Theory I	2+0	7.5
İÇT504	Design Theory II	2+0	7.5
İÇT507	Furniture design and Conceptual Approaches	3+0	7.5
İÇT517	Professional Ethics	3+0	7.5
İÇT518	Continuity in Interior and Environmental Design	3+0	7.5
İÇT519	Phychology and Space	3+0	7.5
İÇT521	20th Century Interior Design History	3+0	7.5
İÇT524	Human/User Centered Space Design	3+0	7.5
İÇT525	Material Design	3+0	7.5

İÇT527	Computer Aided Manufacturing and Practice	3+0	7.5
İÇT528	Composite Material Technology	3+0	7.5
İÇT531	Interior Space	3+0	7.5
İÇT552	Corporate Identity and Space Design	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UİÇ701	Research in Area of Specialization	3+0	4.5
UİÇ702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF ADVANCED TECHNOLOGIES

Head : Prof.Dr. Uğur SERİNCAN

DOCTORATE DEGREE (PH.D)

PROGRAM IN NANOTECHNOLOGY (ENGLISH)

PROGRAM

I.Semester				II.Semester			
Seçmeli Dersler	- -	30.0		İTN692 (Eng)	Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
		-----					-----
		30.0					30.0

III.Semester					IV.Semester		
DYS000	Qualifying Exam	0+0	0.0	İTN890-0 (Eng)	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

V.Semester					VI.Semester		
İTN890 (Eng)	Thesis	0+1	30.0	İTN890 (Eng)	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

VII.Semester					VIII.Semester		
İTN890 (Eng)	Thesis	0+1	30.0	İTN890 (Eng)	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
İTN609 (Eng)	Fundamentals of Semiconductor Devices and Technology	3+0	7.5
İTN610 (Eng)	Nano Imaging and Nano Analysis	3+0	7.5
İTN611 (Eng)	Applied Quantum Mechanics	3+0	7.5
İTN612 (Eng)	Molecular Beam Epitaxy:Principles and Applications	3+0	7.5

İTN613 (Eng)	Photovoltaics and Solar Energy Materials	3+0	7.5
İTN614 (Eng)	Nuclear Magnetic Resonance Spectroscopy	3+0	7.5
İTN615 (Eng)	Electron Backscattered Diffractometry	3+0	7.5
İTN617 (Eng)	Advanced Topics in Nanotechnology	3+0	7.5
İTN619 (Eng)	Computation,Simulation and Modelling in Nanotechnology	3+0	7.5
İTN620 (Eng)	Properties and Synthesis of Carbon Nanomaterials	3+0	7.5
İTN621 (Eng)	Focussed Ion Beam Techniques for Nanofabrication	3+0	7.5
İTN622 (Eng)	Soft Materials	3+0	7.5
İTN623 (Eng)	Reticular Materials	3+0	7.5
İTN625 (Eng)	Advanced Functional Materials	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UİT901 (Eng)	Research in Area of Specialization	5+0	7.5
UİT902 (Eng)	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM IN BIOTECHNOLOGY

Advanced Technologies Research Unit was founded in 2004 in order to plan, coordinate and to put in application the interdisciplinary research projects which will be performed according to the scientific and technological priorities of the 21st century. Mission of the Advanced Technologies Research Unit: -Determining the science and technology platform of Anadolu University -Performing interdisciplinary projects -Improving University-Industry collaboration -Tending to be a technology center Mission of the Advanced Technologies Research Unit: Providing Anadolu University to have an important position at the field of science and technology both in Turkey and in the world, and to be a center of excellence at certain fields. Advanced Technologies Research Unit has three sub-units: -Nanotechnology -Biotechnology -Documenting Cultural Heritage

PROGRAM

I.Semester				II.Semester			
İTB501	Biotechnology	3+0	7.5	İTB504	Biotechnology Laboratory Techniques II	3+0	7.5
İTB503	Biotechnology Laboratory Techniques I	3+0	7.5	İTB592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
İTB790	Thesis	0+1	30.0	İTB790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

BİY530	Plant Tissue Culture	3+0	7.5
BİY531	Immunology	3+0	7.5
BİY539	Microbial Enzymes and Biotechnology	3+0	7.5
BİY545	Advanced Biochemistry	3+0	7.5
BİY548	Modern Biotechnology	3+0	7.5
BİY551	Stem Cell Biology	3+0	7.5
BİY614	Basic Bioinformatics	3+0	7.5
BİY621	Advanced Molecular Genetics	3+0	7.5
ÇEV530	Anaerobic Biotechnology for the Treatment of Wastes	3+0	7.5
ÇEV616	Advanced Disinfection Techniques	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
FKG510	Pharmacobiotechnology	3+0	7.5
FKL501	Experimental Pharmacology	3+0	7.5

FTK501	Advanced Toxicology	3+0	7.5
İTB505	Biomaterials	3+0	7.5
İTB506	Drug Design and Application	3+0	7.5
İTB507	Biometer	3+0	7.5
İTB508	Applications of High Performance Liquid Chromatography in Biotechnology	3+0	7.5
İTB509	Biotechnological Production of Medicine Raw Materials	3+0	7.5
İTB510	Biosensors and Their Basic Principles	3+0	7.5
İTB511	DNA Vaccines and Viral Vector	3+0	7.5
İTB513	Antisense Technology and its Applications	3+0	7.5
İTB515	Microorganisms in Bioelectrochemical Systems	3+0	7.5
İTB517	Biosafety in Microbiology Laboratory	3+0	7.5
İTB519	Microbial Bioremediation and Biodegradation	3+0	7.5
İTB521	Microbial Biotechnology	3+0	7.5
İTB523	Molecular Pharmacological Methods	2+1	7.5
İTB525	Introduction to Synthetic Biology and Metabolic Engineering	3+0	7.5
İTB526	Advanced Chromatographic Techniques	3+0	7.5
İTB527	Biological Screening Tests of Natural Products	3+0	7.5
İTB529	Seperation and PurificationTechniques of Biomolecules	3+0	7.5
İTB531	Electrochemical Biosensors	3+0	7.5
İTB533	Gas Chromatography and Applications in Biotechnology	2+1	7.5
İTB535	Gene Therapy Techniques	3+0	7.5
KİM609	Advanced Polymer Chemistry	3+0	7.5
KMH516	Physical Operations in Food Technologies	3+0	7.5
KMH518	New and Renewable Energy Sources	3+0	7.5
MAT517	Applied Mathematics	3+0	7.5
MİM505	Ecological Planning and Design	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UİT701	Research in Area of Specialization	3+0	4.5
UİT702	Research in Area of Specialization	3+0	4.5

PROGRAM IN ENERGY RESOURCES AND MANAGEMENT

PROGRAM

I.Semester				II.Semester			
İTE503	Energy Economics	3+0	7.5	İTE502	Sustainable Energy Management	3+0	7.5
İTE505	Renewable Energy Sources	3+0	7.5	İTE592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
İTE790	Thesis	0+1	30.0	İTE790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
İTE516	Petroleum Refinery Engineering	3+0	7.5
İTE518	Using of Coal and Coal Technologies	3+0	7.5
İTE519	Solar Energy and its Applications	3+0	7.5
İTE520	Electrochemical Energy Conversion Systems	3+0	7.5
İTE521	Fuels and Combustion Technology	3+0	7.5
İTE522	Renewable Energy Sources and Smart Grids	3+0	7.5
İTE523	Coal Processing Technologies	3+0	7.5

İTE524	Energy Audit for Buildings	3+0	7.5
İTE525	Management of Energy Plant Wastes	3+0	7.5
İTE526	Wind Energy	4+0	7.5
İTE527	Energy Efficient Lighting Technologies	3+0	7.5
İTE528	Nuclear Energy and Politics	3+0	7.5
İTE529	Different Energy Sources, Sustainability and Life Cycle Assessment	3+0	7.5
İTE530	Energy Storage Devices and Applications	3+0	7.5
İTE531	Waste-to-Energy Systems Credit	3+0	7.5
İTE532	Electromagnetic Energy: From Motors to Laser	3+0	7.5
İTE533	Conventional Energy Resources	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UİT701	Research in Area of Specialization	3+0	4.5
UİT702	Research in Area of Specialization	3+0	4.5

PROGRAM IN NANOTECHNOLOGY

Advanced Technologies Research Unit was founded in 2004 in order to plan, coordinate and to put in application the interdisciplinary research projects which will be performed according to the scientific and technological priorities of the 21st century. Mission of the Advanced Technologies Research Unit: -Determining the science and technology platform of Anadolu University -Performing interdisciplinary projects -Improving University-Industry collaboration -Tending to be a technology center Mission of the Advanced Technologies Research Unit: Providing Anadolu University to have an important position at the field of science and technology both in Turkey and in the world, and to be a center of excellence at certain fields. Advanced Technologies Research Unit has three sub-units: -Nanotechnology -Biotechnology -Documenting Cultural Heritage

PROGRAM

	I.Semester				II.Semester		
İTN501	Atom and Molecular Structure	3+0	7.5	İTN503	Applications of Nanotechnology	3+0	7.5
İTN502	Nanotechnology	3+0	7.5	İTN592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----
			30.0				30.0

	III.Semester				IV.Semester		
İTN790	Thesis	0+1	30.0	İTN790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

ENT501	Industrial Design I	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
FİZ501	Mathematical Physics	3+0	7.5
FİZ508	Quantum Mechanics	3+0	7.5
FİZ514	Electromagnetic Wave Theory	3+0	7.5
FİZ624	Selected Topics in Semiconductors	3+0	7.5
İTN505	Nanocharacterisation I	3+0	7.5
İTN506	Nanocharacterisation II	3+0	7.5
İTN507	Nanomaterials	3+0	7.5
İTN508	Synthesis of Nanomaterials	3+0	7.5
İTN509	Nano-Biotechnology	3+0	7.5
İTN510	Structure Property Relationship in Nanomaterials	3+0	7.5
İTN511	Properties of Nanomaterials	3+0	7.5
İTN512	Nanodevices and Design	3+0	7.5
İTN513	Nanotechnology Applications in Textiles	3+0	7.5
İTN514	Nanomagnetism and Applications	3+0	7.5
İTN515	Epitaxial Crystal Structures and Applications	3+0	7.5
İTN517	Photovoltaic Technologies and Applications	4+0	7.5
KİM513	Chemical Thermodynamics	3+0	7.5

KİM525	Quantum Chemistry	3+0	7.5
KİM529	Catalytic Chemistry	3+0	7.5
KİM531	Modern Analysis Methods I	3+0	7.5
KİM532	Modern Analysis Methods II	3+0	7.5
KİM536	Chromatographic Techniques	3+0	7.5
KİM609	Advanced Polymer Chemistry	3+0	7.5
MAT517	Applied Mathematics	3+0	7.5
MLZ551	Mechanical Behavior of Materials	3+0	7.5
SRM503	Dielectric Materials and Devices	3+0	7.5
SRM506	Structure-Property Relationships in Ceramics	3+0	7.5
SRM521	X-Ray Diffraction Techniques in Materials Characterization	3+0	7.5
SRM528	Advanced Composite Materials	3+0	7.5
SRM602	Transmission Electron Microscopy and Interphase Boundaries	3+0	7.5
SRM608	Ferroelectrics Materials and Devices	3+0	7.5
SRM609	Scanning Electron Microscopy and Chemical Analysis Techniques	3+0	7.5
SRM612	Crystal Anisotropy	3+0	7.5
SRM614	Colloid Chemistry and Reological Behaviour	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UİT701	Research in Area of Specialization	3+0	4.5
UİT702	Research in Area of Specialization	3+0	4.5

PROGRAM IN NANOTECHNOLOGY (ENGLISH)

PROGRAM

I.Semester				II.Semester			
İTN519 (Eng)	Introduction to Nanoscience and Nanotechnology	3+0	7.5	İTN524 (Eng)	Semiconductor Materials and Devices in Nanotechnology	3+0	7.5
İTN521 (Eng)	Nanotechnology and Society	3+0	7.5	İTN592 (Eng)	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

III.Semester				IV.Semester			
İTN790 (Eng)	Thesis	0+1	30.0	İTN790 (Eng)	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
FİZ552 (Eng)	Quantum Physics	3+0	7.5
İTN504 (Eng)	Mathematical Applications in Nanotechnology	3+0	7.5
İTN518 (Eng)	Experimental Techniques for Nanotechnology	3+0	7.5
İTN520 (Eng)	Synthesis of Nanoparticles	3+0	7.5
İTN522 (Eng)	Introduction to Micro and Nano Fabrication	3+0	7.5
İTN523 (Eng)	Physics and Technology for Infrared Detection	3+0	7.5
İTN525 (Eng)	Nano-Electronic Devices	3+0	7.5
İTN527 (Eng)	Basic Characterization Techniques in Nanotechnology	3+0	7.5
İTN528 (Eng)	Nanotechnology Sensors	3+0	7.5
İTN529 (Eng)	Machine Learning	3+0	7.5
İTN530 (Eng)	Nanobiosensors	3+0	7.5
İTN531 (Eng)	Computational Approaches in Nanomaterials	3+0	7.5
İTN532 (Eng)	X-Ray Diffraction in Analysis of Thin Films	3+0	7.5
İTN533 (Eng)	Nanotechnology and Biological Applications	3+0	7.5
İTN534 (Eng)	Chemistry and Applications of Organic Electronic Materials	3+0	7.5
İTN535 (Eng)	Transparent Ceramic and Glass-Ceramic Materials	3+0	7.5

İTN536 (Eng)	Atomistic Simulation Laboratory	2+1	7.5
İTN537 (Eng)	Deep Learning and Artificial Neural Networks	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UİT701 (Eng)	Research in Area of Specialization	3+0	4.5
UİT702 (Eng)	Research in Area of Specialization	3+0	4.5

(NON-THESIS) MASTER OF SCIENCE (MS) DEGREE

PROGRAM IN ENERGY RESOURCES AND MANAGEMENT

PROGRAM

I.Semester				II.Semester			
İTE503	Energy Economics	3+0	7.5	İTE502	Sustainable Energy Management	3+0	7.5
İTE505	Renewable Energy Sources	3+0	7.5	İTE599	Semester Project	3+0	0.0
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	22.5
			-----				-----
			30.0				30.0

Elective Courses

İTE516	Petroleum Refinery Engineering	3+0	7.5
İTE518	Using of Coal and Coal Technologies	3+0	7.5
İTE519	Solar Energy and its Applications	3+0	7.5
İTE520	Electrochemical Energy Conversion Systems	3+0	7.5
İTE521	Fuels and Combustion Technology	3+0	7.5
İTE522	Renewable Energy Sources and Smart Grids	3+0	7.5
İTE523	Coal Processing Technologies	3+0	7.5
İTE524	Energy Audit for Buildings	3+0	7.5
İTE525	Management of Energy Plant Wastes	3+0	7.5
İTE526	Wind Energy	4+0	7.5
İTE527	Energy Efficient Lighting Technologies	3+0	7.5
İTE528	Nuclear Energy and Politics	3+0	7.5
İTE529	Different Energy Sources, Sustainability and Life Cycle Assessment	3+0	7.5
İTE531	Waste-to-Energy Systems Credit	3+0	7.5
İTE533	Conventional Energy Resources	3+0	7.5

PROGRAM IN DOCUMENTING CULTURAL HERITAGE

PROGRAM

I.Semester				II.Semester			
BEL501	Terresterial Photogrammetry and Laser Scanning	2+2	7.5	BEL599	Term Project	3+0	0.0
KOR525	Conservation History and Theories	3+0	7.5		*Seçmeli Dersler*	--	30.0
KOR527	Research and Documentation Methods in Protection	3+0	7.5				
	Seçmeli Dersler	--	7.5				
			-----				-----

	30.0		30.0

Elective Courses

ARK546	Construction Elements in Archaic Age	3+0	7.5
ARK547	Architecture and Urbanization in Archaic Age	3+0	7.5
ARK567	Structural and Chemical Properties of Archaeological Structure Materials	3+0	7.5
BEL505	Construction History Researches	3+0	7.5
BEL507	Dating Methods Used in Archaeology	3+0	7.5
BEL509	Dating by OSL/TL Methods	3+0	7.5
BEL511	Application of SEM and X-ray Analysis Techniques on Archaeological Samples	3+0	7.5
BEL513	Archaeological Stratigraphy	4+0	7.5
KOR506	Technics of Documentation	3+0	7.5
KOR520	The Management of Cultural Heritage	3+0	7.5
KOR521	World Heritage Sites in Turkey	3+0	7.5
KOR545	Cultural Heritage And Accessibility	3+0	7.5
KOR610	Conservation of Rural Architectural Heritage	3+0	7.5
KOR613	New Touches to The Historical Texture	3+0	7.5
KOR614	Typological Readings in the Historical Environment	3+0	7.5
UCS519	Automated Mapping and Facility Management Systems	3+0	7.5
UCS533	Fundamentals of Mapping and Geographical Information Systems	3+0	7.5

DEPARTMENT OF CIVIL ENGINEERING

Head : Prof.Dr. Aynur ŞENSOY ŞORMAN

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester					**II.Semester**		
Seçmeli Dersler	- -	30.0		İNŞ692	Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
		-----					-----
		30.0					30.0
III.Semester					**IV.Semester**		
DYS000	Qualifying Exam	0+0	0.0	İNŞ890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0
V.Semester					**VI.Semester**		
İNŞ890	Thesis	0+1	30.0	İNŞ890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0
VII.Semester					**VIII.Semester**		
İNŞ890	Thesis	0+1	30.0	İNŞ890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
İNŞ605	Mechanics of Continua I	3+0	7.5
İNŞ606	Mechanics of Continua II	3+0	7.5
İNŞ607	Soil Behavior	3+0	7.5
İNŞ611	Earthquake Engineering	3+0	7.5
İNŞ614	Project Management	3+0	7.5
İNŞ615	Quality Management in Construction	3+0	7.5
İNŞ616	Computational Hydraulics	3+0	7.5
İNŞ621	Soil Dynamics	3+0	7.5
İNŞ622	Measurement of Soil Properties	3+0	7.5
İNŞ623	In-situ Testing of Concrete	3+0	7.5
İNŞ626	Cross-Cultural Management in International Construction Projects	3+0	7.5
İNŞ627	Advanced Labor Health and Job Safety Management	3+0	7.5
İNŞ628	Knowledge Management in Construction	3+0	7.5
İNŞ629	Pavement Management Systems	3+0	7.5
İNŞ630	Experimental and Computational Methods to Characterize Bituminous Materials	3+0	7.5
İNŞ631	Design of Seismic Isolated Structures	3+0	7.5
İNŞ632	Design of Ductile Steel Structures	3+0	7.5
İNŞ633	Hydrological Forecasting and Early Warning Systems	3+0	7.5
İNŞ635	Seismic Performance Assessment of Buildings	3+0	7.5
İNŞ636	Experimental Design in Geotechnical Engineering	3+0	7.5
İNŞ637	Remote Sensing and Geographic Information Systems Applications in Water Resources	3+0	7.5
İNŞ639	Experimental Design in Structural Engineering	3+0	7.5
İNŞ642	Fluid Dynamics Simulation Based Design	3+0	7.5
İNŞ643	Seismic Isolator Tests, Characterization and Modeling	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UİN901	Research in Area of Specialization	5+0	7.5
UİN902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM IN GEOTECHNIQUES

PROGRAM

I.Semester				II.Semester			
İNŞ577	Experimental Applications in Geotechnical Engineering	1+2	7.5	İNŞ592	Seminar	3+0	7.5
MEK501	Advanced Soil Mechanics	3+0	7.5	MAT517	Applied Mathematics	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
İNŞ790	Thesis	0+1	30.0	İNŞ790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5

HİD501	Watershed Hydrology	3+0	7.5
İNŞ503	Advanced Foundation Engineering	3+0	7.5
İNŞ504	Soil Modeling	3+0	7.5
İNŞ505	Slope Stability Analysis	3+0	7.5
İNŞ509	River Hydraulics	3+0	7.5
İNŞ510	Economic Analysis of Engineering Systems	3+0	7.5
İNŞ511	Flood Control	3+0	7.5
İNŞ513	Dams	3+0	7.5
İNŞ514	Planning and Design of Dams	3+0	7.5
İNŞ520	Advanced Groundwater Hydrology	3+0	7.5
İNŞ526	Construction Management	3+0	7.5
İNŞ528	Construction Cost Analysis and Estimating	3+0	7.5
İNŞ531	Contract and Cost Management	3+0	7.5
İNŞ536	Law in Construction Projects	3+0	7.5
İNŞ539	Introduction to Finite Elements	3+0	7.5
İNŞ541	Advanced Pavement Design	3+0	7.5
İNŞ542	Neural Network Applications In Transportation Engineering	3+0	7.5
İNŞ543	Theory of Elasticity	3+0	7.5
İNŞ544	Structural Dynamics	3+0	7.5
İNŞ545	Advanced Structural Analysis	3+0	7.5
İNŞ546	Theory and Design for Tests and Measurements on Construction Materials	3+0	7.5
İNŞ547	Urban Hydrology and Hydraulics	3+0	7.5
İNŞ548	Applications of Geosynthetics	3+0	7.5
İNŞ549	Deep Excavations and Retaining Structures	3+0	7.5
İNŞ551	Repair and Strengthening of Structures	3+0	7.5
İNŞ552	Advanced Railway Design	3+0	7.5
İNŞ553	Advanced Highway Design	3+0	7.5
İNŞ554	International Construction Project Management	3+0	7.5
İNŞ556	Plastic Design of Steel Structures	3+0	7.5
İNŞ557	Soil Structures and Ground Improvement Techniques	3+0	7.5
İNŞ558	Hydrology of Floods and Droughts	3+0	7.5
İNŞ559	Hydrologic Modeling	3+0	7.5
İNŞ560	Bituminous Mixtures Design and Technology	3+0	7.5
İNŞ561	Pavement Maintenance-Rehabilitation and Recycling Strategies	3+0	7.5
İNŞ562	Applications of Soil Dynamics	3+0	7.5
İNŞ563	Advances in Sediment Transport Research	3+0	7.5
İNŞ564	Materials Science of Concrete	3+0	7.5
İNŞ565	Cold-Formed Steel Structures	3+0	7.5
İNŞ566	Similarity and Model Theory	3+0	7.5
İNŞ567	Experimental Methods in Advanced Fluid Mechanics	3+0	7.5
İNŞ569	Design of Composite Structures	3+0	7.5
İNŞ571	Geotechnical Engineering and Computer Applications	3+0	7.5
MAT507	Applied Mathematics I	3+0	7.5
MAT508	Applied Mathematics II	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UİN701	Research in Area of Specialization	3+0	4.5
UİN702	Research in Area of Specialization	3+0	4.5

PROGRAM IN HYDRAULICS

PROGRAM

I.Semester				II.Semester			
İNŞ508	Stochastic Methods in Hydrology	3+0	7.5	İNŞ592	Seminar	3+0	7.5
İNŞ519	Water Resources Systems	3+0	7.5	MAT517	Applied Mathematics	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----

			30.0				30.0
	III.Semester				**IV.Semester**		
İNŞ790	Thesis	0+1	30.0	İNŞ790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
HİD501	Watershed Hydrology	3+0	7.5
İNŞ503	Advanced Foundation Engineering	3+0	7.5
İNŞ504	Soil Modeling	3+0	7.5
İNŞ505	Slope Stability Analysis	3+0	7.5
İNŞ509	River Hydraulics	3+0	7.5
İNŞ510	Economic Analysis of Engineering Systems	3+0	7.5
İNŞ511	Flood Control	3+0	7.5
İNŞ513	Dams	3+0	7.5
İNŞ514	Planning and Design of Dams	3+0	7.5
İNŞ520	Advanced Groundwater Hydrology	3+0	7.5
İNŞ526	Construction Management	3+0	7.5
İNŞ528	Construction Cost Analysis and Estimating	3+0	7.5
İNŞ531	Contract and Cost Management	3+0	7.5
İNŞ539	Introduction to Finite Elements	3+0	7.5
İNŞ541	Advanced Pavement Design	3+0	7.5
İNŞ542	Neural Network Applications In Transportation Engineering	3+0	7.5
İNŞ543	Theory of Elasticity	3+0	7.5
İNŞ544	Structural Dynamics	3+0	7.5
İNŞ545	Advanced Structural Analysis	3+0	7.5
İNŞ546	Theory and Design for Tests and Measurements on Construction Materials	3+0	7.5
İNŞ547	Urban Hydrology and Hydraulics	3+0	7.5
İNŞ548	Applications of Geosynthetics	3+0	7.5
İNŞ549	Deep Excavations and Retaining Structures	3+0	7.5
İNŞ551	Repair and Strengthening of Structures	3+0	7.5
İNŞ552	Advanced Railway Design	3+0	7.5
İNŞ553	Advanced Highway Design	3+0	7.5
İNŞ554	International Construction Project Management	3+0	7.5
İNŞ556	Plastic Design of Steel Structures	3+0	7.5
İNŞ557	Soil Structures and Ground Improvement Techniques	3+0	7.5
İNŞ558	Hydrology of Floods and Droughts	3+0	7.5
İNŞ559	Hydrologic Modeling	3+0	7.5
İNŞ560	Bituminous Mixtures Design and Technology	3+0	7.5
İNŞ561	Pavement Maintenance-Rehabilitation and Recycling Strategies	3+0	7.5
İNŞ563	Advances in Sediment Transport Research	3+0	7.5
İNŞ564	Materials Science of Concrete	3+0	7.5
İNŞ565	Cold-Formed Steel Structures	3+0	7.5
İNŞ566	Similarity and Model Theory	3+0	7.5
İNŞ567	Experimental Methods in Advanced Fluid Mechanics	3+0	7.5
İNŞ569	Design of Composite Structures	3+0	7.5
MAT507	Applied Mathematics I	3+0	7.5
MAT508	Applied Mathematics II	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UİN701	Research in Area of Specialization	3+0	4.5
UİN702	Research in Area of Specialization	3+0	4.5

PROGRAM IN MECHANICS

PROGRAM

	I.Semester				II.Semester		
İNŞ573	Computer Programing for Structural Engineering	3+0	7.5	İNŞ522	Matrix Methods for Computing Structural Systems	3+0	7.5
	Seçmeli Dersler	--	22.5	İNŞ592	Seminar	3+0	7.5
				MAT517	Applied Mathematics	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

	III.Semester				IV.Semester		
İNŞ790	Thesis	0+1	30.0	İNŞ790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
HİD501	Watershed Hydrology	3+0	7.5
İNŞ503	Advanced Foundation Engineering	3+0	7.5
İNŞ504	Soil Modeling	3+0	7.5
İNŞ505	Slope Stability Analysis	3+0	7.5
İNŞ509	River Hydraulics	3+0	7.5
İNŞ510	Economic Analysis of Engineering Systems	3+0	7.5
İNŞ511	Flood Control	3+0	7.5
İNŞ513	Dams	3+0	7.5
İNŞ514	Planning and Design of Dams	3+0	7.5
İNŞ520	Advanced Groundwater Hydrology	3+0	7.5
İNŞ526	Construction Management	3+0	7.5
İNŞ528	Construction Cost Analysis and Estimating	3+0	7.5
İNŞ531	Contract and Cost Management	3+0	7.5
İNŞ539	Introduction to Finite Elements	3+0	7.5
İNŞ541	Advanced Pavement Design	3+0	7.5
İNŞ542	Neural Network Applications In Transportation Engineering	3+0	7.5
İNŞ543	Theory of Elasticity	3+0	7.5
İNŞ544	Structural Dynamics	3+0	7.5
İNŞ545	Advanced Structural Analysis	3+0	7.5
İNŞ546	Theory and Design for Tests and Measurements on Construction Materials	3+0	7.5
İNŞ547	Urban Hydrology and Hydraulics	3+0	7.5
İNŞ548	Applications of Geosynthetics	3+0	7.5
İNŞ549	Deep Excavations and Retaining Structures	3+0	7.5
İNŞ551	Repair and Strengthening of Structures	3+0	7.5
İNŞ552	Advanced Railway Design	3+0	7.5
İNŞ553	Advanced Highway Design	3+0	7.5
İNŞ554	International Construction Project Management	3+0	7.5
İNŞ556	Plastic Design of Steel Structures	3+0	7.5
İNŞ557	Soil Structures and Ground Improvement Techniques	3+0	7.5
İNŞ558	Hydrology of Floods and Droughts	3+0	7.5
İNŞ559	Hydrologic Modeling	3+0	7.5
İNŞ560	Bituminous Mixtures Design and Technology	3+0	7.5
İNŞ561	Pavement Maintenance-Rehabilitation and Recycling Strategies	3+0	7.5
İNŞ563	Advances in Sediment Transport Research	3+0	7.5
İNŞ564	Materials Science of Concrete	3+0	7.5
İNŞ565	Cold-Formed Steel Structures	3+0	7.5
İNŞ566	Similarity and Model Theory	3+0	7.5
İNŞ567	Experimental Methods in Advanced Fluid Mechanics	3+0	7.5
İNŞ569	Design of Composite Structures	3+0	7.5
MAT507	Applied Mathematics I	3+0	7.5
MAT508	Applied Mathematics II	3+0	7.5

TAÇ701	Thesis Research Study Course	3+0	7.5
UİN701	Research in Area of Specialization	3+0	4.5
UİN702	Research in Area of Specialization	3+0	4.5

PROGRAM IN TRANSPORTATION

PROGRAM

I.Semester				II.Semester			
İNŞ575	Rigid Pavements	3+0	7.5	İNŞ552	Advanced Railway Design	3+0	7.5
	Seçmeli Dersler	--	22.5	İNŞ592	Seminar	3+0	7.5
				MAT517	Applied Mathematics	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
İNŞ790	Thesis	0+1	30.0	İNŞ790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
HİD501	Watershed Hydrology	3+0	7.5
İNŞ503	Advanced Foundation Engineering	3+0	7.5
İNŞ504	Soil Modeling	3+0	7.5
İNŞ505	Slope Stability Analysis	3+0	7.5
İNŞ509	River Hydraulics	3+0	7.5
İNŞ510	Economic Analysis of Engineering Systems	3+0	7.5
İNŞ511	Flood Control	3+0	7.5
İNŞ513	Dams	3+0	7.5
İNŞ514	Planning and Design of Dams	3+0	7.5
İNŞ520	Advanced Groundwater Hydrology	3+0	7.5
İNŞ526	Construction Management	3+0	7.5
İNŞ528	Construction Cost Analysis and Estimating	3+0	7.5
İNŞ531	Contract and Cost Management	3+0	7.5
İNŞ539	Introduction to Finite Elements	3+0	7.5
İNŞ540	Advanced Highway Materials	3+0	7.5
İNŞ541	Advanced Pavement Design	3+0	7.5
İNŞ542	Neural Network Applications In Transportation Engineering	3+0	7.5
İNŞ543	Theory of Elasticity	3+0	7.5
İNŞ544	Structural Dynamics	3+0	7.5
İNŞ545	Advanced Structural Analysis	3+0	7.5
İNŞ546	Theory and Design for Tests and Measurements on Construction Materials	3+0	7.5
İNŞ547	Urban Hydrology and Hydraulics	3+0	7.5
İNŞ548	Applications of Geosynthetics	3+0	7.5
İNŞ549	Deep Excavations and Retaining Structures	3+0	7.5
İNŞ551	Repair and Strengthening of Structures	3+0	7.5
İNŞ553	Advanced Highway Design	3+0	7.5
İNŞ554	International Construction Project Management	3+0	7.5
İNŞ556	Plastic Design of Steel Structures	3+0	7.5
İNŞ557	Soil Structures and Ground Improvement Techniques	3+0	7.5
İNŞ558	Hydrology of Floods and Droughts	3+0	7.5
İNŞ559	Hydrologic Modeling	3+0	7.5
İNŞ560	Bituminous Mixtures Design and Technology	3+0	7.5

İNŞ561	Pavement Maintenance-Rehabilitation and Recycling Strategies	3+0	7.5
İNŞ563	Advances in Sediment Transport Research	3+0	7.5
İNŞ564	Materials Science of Concrete	3+0	7.5
İNŞ565	Cold-Formed Steel Structures	3+0	7.5
İNŞ566	Similarity and Model Theory	3+0	7.5
İNŞ567	Experimental Methods in Advanced Fluid Mechanics	3+0	7.5
İNŞ569	Design of Composite Structures	3+0	7.5
İNŞ629	Pavement Management Systems	3+0	7.5
MAT507	Applied Mathematics I	3+0	7.5
MAT508	Applied Mathematics II	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UİN701	Research in Area of Specialization	3+0	4.5
UİN702	Research in Area of Specialization	3+0	4.5

PROGRAM IN CONSTRUCTION

PROGRAM

I.Semester				II.Semester			
İNŞ573	Computer Programing for Structural Engineering	3+0	7.5	İNŞ522	Matrix Methods for Computing Structural Systems	3+0	7.5
	Seçmeli Dersler	--	22.5	İNŞ592	Seminar	3+0	7.5
				MAT517	Applied Mathematics	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
İNŞ790	Thesis	0+1	30.0	İNŞ790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
HİD501	Watershed Hydrology	3+0	7.5
İNŞ503	Advanced Foundation Engineering	3+0	7.5
İNŞ504	Soil Modeling	3+0	7.5
İNŞ505	Slope Stability Analysis	3+0	7.5
İNŞ509	River Hydraulics	3+0	7.5
İNŞ510	Economic Analysis of Engineering Systems	3+0	7.5
İNŞ511	Flood Control	3+0	7.5
İNŞ513	Dams	3+0	7.5
İNŞ514	Planning and Design of Dams	3+0	7.5
İNŞ520	Advanced Groundwater Hydrology	3+0	7.5
İNŞ526	Construction Management	3+0	7.5
İNŞ528	Construction Cost Analysis and Estimating	3+0	7.5
İNŞ531	Contract and Cost Management	3+0	7.5
İNŞ539	Introduction to Finite Elements	3+0	7.5
İNŞ541	Advanced Pavement Design	3+0	7.5
İNŞ542	Neural Network Applications In Transportation Engineering	3+0	7.5
İNŞ543	Theory of Elasticity	3+0	7.5
İNŞ544	Structural Dynamics	3+0	7.5
İNŞ545	Advanced Structural Analysis	3+0	7.5
İNŞ546	Theory and Design for Tests and Measurements on Construction Materials	3+0	7.5
İNŞ547	Urban Hydrology and Hydraulics	3+0	7.5

İNŞ548	Applications of Geosynthetics	3+0	7.5
İNŞ549	Deep Excavations and Retaining Structures	3+0	7.5
İNŞ551	Repair and Strengthening of Structures	3+0	7.5
İNŞ552	Advanced Railway Design	3+0	7.5
İNŞ553	Advanced Highway Design	3+0	7.5
İNŞ554	International Construction Project Management	3+0	7.5
İNŞ556	Plastic Design of Steel Structures	3+0	7.5
İNŞ557	Soil Structures and Ground Improvement Techniques	3+0	7.5
İNŞ558	Hydrology of Floods and Droughts	3+0	7.5
İNŞ559	Hydrologic Modeling	3+0	7.5
İNŞ560	Bituminous Mixtures Design and Technology	3+0	7.5
İNŞ561	Pavement Maintenance-Rehabilitation and Recycling Strategies	3+0	7.5
İNŞ563	Advances in Sediment Transport Research	3+0	7.5
İNŞ564	Materials Science of Concrete	3+0	7.5
İNŞ565	Cold-Formed Steel Structures	3+0	7.5
İNŞ566	Similarity and Model Theory	3+0	7.5
İNŞ567	Experimental Methods in Advanced Fluid Mechanics	3+0	7.5
İNŞ569	Design of Composite Structures	3+0	7.5
MAT507	Applied Mathematics I	3+0	7.5
MAT508	Applied Mathematics II	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UİN701	Research in Area of Specialization	3+0	4.5
UİN702	Research in Area of Specialization	3+0	4.5

PROGRAM IN CONSTRUCTION MATERIALS

PROGRAM

	I.Semester				II.Semester		
İNŞ555	Advanced Concrete Technology	3+0	7.5	İNŞ536	Law in Construction Projects	3+0	7.5
	Seçmeli Dersler	--	22.5	İNŞ592	Seminar	3+0	7.5
				MAT517	Applied Mathematics	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

	III.Semester				IV.Semester		
İNŞ790	Thesis	0+1	30.0	İNŞ790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

ENM501	Design and Analysis of Experiments	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
HİD501	Watershed Hydrology	3+0	7.5
İNŞ503	Advanced Foundation Engineering	3+0	7.5
İNŞ504	Soil Modeling	3+0	7.5
İNŞ505	Slope Stability Analysis	3+0	7.5
İNŞ509	River Hydraulics	3+0	7.5
İNŞ510	Economic Analysis of Engineering Systems	3+0	7.5
İNŞ511	Flood Control	3+0	7.5
İNŞ513	Dams	3+0	7.5
İNŞ514	Planning and Design of Dams	3+0	7.5
İNŞ520	Advanced Groundwater Hydrology	3+0	7.5
İNŞ526	Construction Management	3+0	7.5

İNŞ528	Construction Cost Analysis and Estimating	3+0	7.5
İNŞ531	Contract and Cost Management	3+0	7.5
İNŞ539	Introduction to Finite Elements	3+0	7.5
İNŞ541	Advanced Pavement Design	3+0	7.5
İNŞ542	Neural Network Applications In Transportation Engineering	3+0	7.5
İNŞ543	Theory of Elasticity	3+0	7.5
İNŞ544	Structural Dynamics	3+0	7.5
İNŞ545	Advanced Structural Analysis	3+0	7.5
İNŞ546	Theory and Design for Tests and Measurements on Construction Materials	3+0	7.5
İNŞ547	Urban Hydrology and Hydraulics	3+0	7.5
İNŞ548	Applications of Geosynthetics	3+0	7.5
İNŞ549	Deep Excavations and Retaining Structures	3+0	7.5
İNŞ551	Repair and Strengthening of Structures	3+0	7.5
İNŞ552	Advanced Railway Design	3+0	7.5
İNŞ553	Advanced Highway Design	3+0	7.5
İNŞ554	International Construction Project Management	3+0	7.5
İNŞ556	Plastic Design of Steel Structures	3+0	7.5
İNŞ557	Soil Structures and Ground Improvement Techniques	3+0	7.5
İNŞ558	Hydrology of Floods and Droughts	3+0	7.5
İNŞ559	Hydrologic Modeling	3+0	7.5
İNŞ560	Bituminous Mixtures Design and Technology	3+0	7.5
İNŞ561	Pavement Maintenance-Rehabilitation and Recycling Strategies	3+0	7.5
İNŞ563	Advances in Sediment Transport Research	3+0	7.5
İNŞ564	Materials Science of Concrete	3+0	7.5
İNŞ565	Cold-Formed Steel Structures	3+0	7.5
İNŞ566	Similarity and Model Theory	3+0	7.5
İNŞ567	Experimental Methods in Advanced Fluid Mechanics	3+0	7.5
İNŞ569	Design of Composite Structures	3+0	7.5
MAT507	Applied Mathematics I	3+0	7.5
MAT508	Applied Mathematics II	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UİN701	Research in Area of Specialization	3+0	4.5
UİN702	Research in Area of Specialization	3+0	4.5

PROGRAM IN CONSTRUCTION MANAGEMENT

PROGRAM

	I.Semester				**II.Semester**		
İNŞ554	International Construction Project Management	3+0	7.5	İNŞ536	Law in Construction Projects	3+0	7.5
	Seçmeli Dersler	--	22.5	İNŞ592	Seminar	3+0	7.5
				MAT517	Applied Mathematics	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

	III.Semester				**IV.Semester**		
İNŞ790	Thesis	0+1	30.0	İNŞ790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
HİD501	Watershed Hydrology	3+0	7.5

İNŞ503	Advanced Foundation Engineering	3+0	7.5
İNŞ504	Soil Modeling	3+0	7.5
İNŞ505	Slope Stability Analysis	3+0	7.5
İNŞ509	River Hydraulics	3+0	7.5
İNŞ510	Economic Analysis of Engineering Systems	3+0	7.5
İNŞ511	Flood Control	3+0	7.5
İNŞ513	Dams	3+0	7.5
İNŞ514	Planning and Design of Dams	3+0	7.5
İNŞ520	Advanced Groundwater Hydrology	3+0	7.5
İNŞ526	Construction Management	3+0	7.5
İNŞ528	Construction Cost Analysis and Estimating	3+0	7.5
İNŞ531	Contract and Cost Management	3+0	7.5
İNŞ539	Introduction to Finite Elements	3+0	7.5
İNŞ541	Advanced Pavement Design	3+0	7.5
İNŞ542	Neural Network Applications In Transportation Engineering	3+0	7.5
İNŞ543	Theory of Elasticity	3+0	7.5
İNŞ544	Structural Dynamics	3+0	7.5
İNŞ545	Advanced Structural Analysis	3+0	7.5
İNŞ546	Theory and Design for Tests and Measurements on Construction Materials	3+0	7.5
İNŞ547	Urban Hydrology and Hydraulics	3+0	7.5
İNŞ548	Applications of Geosynthetics	3+0	7.5
İNŞ549	Deep Excavations and Retaining Structures	3+0	7.5
İNŞ551	Repair and Strengthening of Structures	3+0	7.5
İNŞ552	Advanced Railway Design	3+0	7.5
İNŞ553	Advanced Highway Design	3+0	7.5
İNŞ556	Plastic Design of Steel Structures	3+0	7.5
İNŞ557	Soil Structures and Ground Improvement Techniques	3+0	7.5
İNŞ558	Hydrology of Floods and Droughts	3+0	7.5
İNŞ559	Hydrologic Modeling	3+0	7.5
İNŞ560	Bituminous Mixtures Design and Technology	3+0	7.5
İNŞ561	Pavement Maintenance-Rehabilitation and Recycling Strategies	3+0	7.5
İNŞ563	Advances in Sediment Transport Research	3+0	7.5
İNŞ564	Materials Science of Concrete	3+0	7.5
İNŞ565	Cold-Formed Steel Structures	3+0	7.5
İNŞ566	Similarity and Model Theory	3+0	7.5
İNŞ567	Experimental Methods in Advanced Fluid Mechanics	3+0	7.5
İNŞ569	Design of Composite Structures	3+0	7.5
MAT507	Applied Mathematics I	3+0	7.5
MAT508	Applied Mathematics II	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UİN701	Research in Area of Specialization	3+0	4.5
UİN702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF STATISTICS

Head : Prof.Dr. İlhan USTA

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester				II.Semester		
Seçmeli Dersler	-	30.0	İST692	Seminar	3+0	7.5
	-			*Seçmeli Dersler*	--	22.5

			-----				-----
			30.0				30.0
	III.Semester				**IV.Semester**		
DYS000	Qualifying Exam	0+0	0.0	İST890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				
							30.0
	V.Semester				**VI.Semester**		
İST890	Thesis	0+1	30.0	İST890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0
	VII.Semester				**VIII.Semester**		
İST890	Thesis	0+1	30.0	İST890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
İST604	Econometric Models	3+0	7.5
İST608	Mathematical Methods of Statistics	3+0	7.5
İST610	Conjoint Analysis	3+0	7.5
İST611	Pearson System I	3+0	7.5
İST612	Pearson System II	3+0	7.5
İST613	Artificial Neural Networks and Statistical Models I	3+0	7.5
İST614	Artificial Neural Networks and Statistical Models II	3+0	7.5
İST615	Mathematics Foundation in Regression Analysis I	3+0	7.5
İST616	Mathematics Foundation in Regression Analysis II	3+0	7.5
İST617	Modern Regression Techniques	3+0	7.5
İST618	Information Theory and Statistics	3+0	7.5
İST621	Advanced Circular Data Analysis	3+0	7.5
İST622	Fuzzy Neural Integrated Systems	3+0	7.5
İST623	Fuzzy Artificial Neural Networks	3+0	7.5
İST625	Entropy Optimization Methods With Applications	3+0	7.5
İST626	Numerical Methods in Modeling with Entropy Optimization Distributions	3+0	7.5
İST627	Fundamentals of Stochastic Differential Equations	3+0	7.5
İST628	Stochastic Differential Equations and Applications	3+0	7.5
İST629	Stochastic Modeling and Analysis	3+0	7.5
İST631	Robust Statistical Methods	3+0	7.5
İST633	Data Visualization	3+0	7.5
İST635	Advanced Theory of Statistics	3+0	7.5
İST636	Econometric Modelling	3+0	7.5
İST637	Stochastic Differantial Equations I	3+0	7.5
İST638	Stochastic Differantial Equations II	3+0	7.5
İST639	Fuzzy Statistics and Probability	3+0	7.5
İST640	Advanced Experimental Design	3+0	7.5
İST641	Advanced Nonparametric Regresyon Models	3+0	7.5
İST642	Modeling with Stochastic Differential Equations	3+0	7.5
İST647	Reliability Theory	3+0	7.5
İST649	Stochastic Differential Equations	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UİS901	Research in Area of Specialization	5+0	7.5
UİS902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
İST506	The Theory of Measure and Probability	3+0	7.5	İST531	Linear Models	3+0	7.5
İST530	Theory of Statistics	3+0	7.5	İST592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

III.Semester				IV.Semester			
İST790	Thesis	0+1	30.0	İST790	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

ARY505	Scientific Research Planning and Evaluation	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
İST505	Econometric Analysis	3+0	7.5
İST507	Circular Data Analysis	3+0	7.5
İST510	Nonparametric Statistical Techniques	3+0	7.5
İST511	Advanced Regression Analysis	3+0	7.5
İST512	Artificial Neural Networks and Statistics	3+0	7.5
İST514	Advanced Statistical Techniques for Researchers	3+0	7.5
İST517	Multiple Relation Techniques for Questionnaires Analysis	3+0	7.5
İST520	Maximum Entropy Method and Its Applications	3+0	7.5
İST521	Continuous Markov Processes	3+0	7.5
İST523	Nonparametric Models With Spline Regression	3+0	7.5
İST524	Generalized Additive Models With Spline Regression	3+0	7.5
İST528	Probabilistic Mixture Theory	3+0	7.5
İST532	Fuzzy Statistical Methods	3+0	7.5
İST536	Statistical Softwares	3+0	7.5
İST537	Actuarial Models	3+0	7.5
İST539	Statistical Simulation	3+0	7.5
İST540	Robust Statistical Methods and Applications	3+0	7.5
İST541	Time Series Analysis with Application	3+0	7.5
İST542	Sampling Theory and Methods	3+0	7.5
İST544	Nonparametric Regression Models	3+0	7.5
İST545	Statistical Analysis with Statistical Packages	3+0	7.5
İST551	Applied Multivariate Statistical Analysis	3+0	7.5
İST552	R For Data Science	3+0	7.5
İST553	Time Series Analysis with Application	3+0	7.5
İST554	Intelligent Optimization Techniques	3+0	7.5
İST555	Machine Learning with R	3+0	7.5
İST557	Explainable Artificial Intelligence	3+0	7.5
İST559	Data Science with Julia	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UİS701	Research in Area of Specialization	3+0	4.5
UİS702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF CHEMISTRY

Head : Prof.Dr. Filiz YILMAZ

DOCTORATE DEGREE (PH.D)

PROGRAM

	I.Semester				II.Semester		
	Seçmeli Dersler	- -	30.0	KİM692	Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
			-----				-----
			30.0				30.0

	III.Semester				IV.Semester		
DYS000	Qualifying Exam	0+0	0.0	KİM890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

	V.Semester				VI.Semester		
KİM890	Thesis	0+1	30.0	KİM890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

	VII.Semester				VIII.Semester		
KİM890	Thesis	0+1	30.0	KİM890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
KİM601	Investigations of Mechanisms in Organic Chemistry I	3+0	7.5
KİM602	Investigations of Mechanisms in Organic Chemistry II	3+0	7.5
KİM603	Organic Synthesis	3+0	7.5
KİM606	Molecular Symmetry and Spectroscopy	3+0	7.5
KİM609	Advanced Polymer Chemistry	3+0	7.5
KİM612	Pericyclic Chemistry	3+0	7.5
KİM614	Conducting Polymers	3+0	7.5
KİM615	Chemistry of Drugs I	3+0	7.5
KİM616	Chemistry of Drugs II	3+0	7.5
KİM617	Statistical Thermodynamics	3+0	7.5
KİM618	Molecular Imprinted Polymers and Applications	3+0	7.5
KİM619	Organic Electrochemistry	3+0	7.5
KİM620	Surface Chemistry	3+0	7.5
KİM621	Supercritical Fluids	3+0	7.5
KİM622	Ion Selective Electrodes	3+0	7.5
KİM623	Affinity Chromatography	3+0	7.5
KİM624	Solvent Extraction Chemistry	3+0	7.5
KİM642	Photochemistry	3+0	7.5
KİM643	Named Reactions in Heterocyclic Chemistry	3+0	7.5
KİM644	Stereochemistry	3+0	7.5
KİM645	Bioorganic Chemistry	3+0	7.5
KİM646	Nanochemistry	3+0	7.5
KİM647	Molecular Structure Calculations and Theories	3+0	7.5
KİM648	Named Reactions in Organic Chemistry	3+0	7.5

KİM649	Organic Functional Group Preparations I	3+0	7.5
KİM650	Organic Functional Group Preparations II	3+0	7.5
KİM651	Biosensors	3+0	7.5
KİM654	Proteomics and Genomics	3+0	7.5
KİM657	Asymmetric Organic Synthesis I	3+0	7.5
KİM658	Asymmetric Organic Synthesis II	3+0	7.5
KİM659	Synthesis of Amino Acids and Peptides	3+0	7.5
KİM665	Bioorganometallic Chemistry	3+0	7.5
KİM667	Metals in Catalytic Reactions I	3+0	7.5
KİM669	Analytical Method Development and Validation	3+0	7.5
KİM675	Polymer-Clay Nanocomposites	3+0	7.5
KİM676	Applications of HPLC and Other Chromatographic Methods in Food Analysis	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UKM901	Research in Area of Specialization	5+0	7.5
UKM902	Research in Area of Specialization	5+0	7.5

PROGRAM IN CHEMISTRY (DISTANCE LEARNING)

PROGRAM

I.Semester				II.Semester		
Seçmeli Dersler	- -	30.0	KİM598	Term Project	3+0	0.0
				Seçmeli Dersler	--	30.0
		-----				-----
		30.0				30.0

Elective Courses

KİM585	Name Reactions in Organic Chemistry	3+0	6.0
KİM586	Sensor Technology	3+0	6.0
KİM587	Alternative Reaction Systems	3+0	6.0
KİM588	Computational Chemistry Applications	0+3	6.0
KİM589	Adsorption	3+0	6.0
KİM591	Thermal and Surface Characterization Methods	3+0	6.0
KİM593	Applications of Modern Analysis Methods I	0+3	6.0
KİM594	Applications of Modern Analysis Methods II	0+3	6.0
KİM595	Analytical Method Development Validation	3+0	6.0
KİM596	Chemistry of Main Elements	3+0	6.0

MASTER OF SCIENCE (MS) DEGREE

PROGRAM IN ANALIYTICAL CHEMISTRY

PROGRAM

I.Semester				II.Semester			
KİM523	Complex Equilibria in Analytical Chemistry	3+0	7.5	KİM584	Modern Analysis Methods II	3+0	7.5
KİM583	Modern Analysis Methods I	3+0	7.5	KİM592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0

			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
KİM790	Thesis	0+1	30.0	KİM790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

EKİM510 (Eng)	Organic Chemistry of Biomaterials	3+0	7.5
EKİM513	Gas Chromatography and Applications	2+1	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
KİM506	Polymer Chemistry	3+0	7.5
KİM509	Carbon-Carbon Bond Formation	3+0	7.5
KİM510	Advanced NMR Techniques	3+0	7.5
KİM511	Electrochemistry	3+0	7.5
KİM516	Physical Organic Chemistry	3+0	7.5
KİM517	Selected Topics in Inorganic Chemistry I	3+0	7.5
KİM521	Adsorption	3+0	7.5
KİM522	Bioanalytical Chemistry	3+0	7.5
KİM524	Bioinorganic Chemistry	3+0	7.5
KİM525	Quantum Chemistry	3+0	7.5
KİM526	Microwave Organic Synthesis	3+0	7.5
KİM529	Catalytic Chemistry	3+0	7.5
KİM533	Electroanalytical Chemistry	3+0	7.5
KİM535	Data Analysis in Chemistry	3+0	7.5
KİM536	Chromatographic Techniques	3+0	7.5
KİM537	Organic Macro Molecules	3+0	7.5
KİM539	Quantitative Structure Property Relationship	3+0	7.5
KİM550	Reagents In Organic Synthesis	3+0	7.5
KİM551	Sensors and Their Applications	3+0	7.5
KİM558	Biochromatography	3+0	7.5
KİM560	Alternative Reaction Systems	3+0	7.5
KİM561	Novel Tendencies in Liquid Chromatography	3+0	7.5
KİM562	Inorganic Polymers	3+0	7.5
KİM563	Natural Product Synthesis I	3+0	7.5
KİM564	Natural Product Synthesis II	3+0	7.5
KİM565	Literature Search in Chemistry	3+0	7.5
KİM566	Stereo Selective Reactions and Practical Approach	3+0	7.5
KİM567	Applications of Computational Chemistry	3+0	7.5
KİM568	Solvent-free Organic Synthesis	3+0	7.5
KİM569	Structure Determination of Organic Chemistry	3+0	7.5
KİM701	Physical Chemistry of Foods	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UKM701	Research in Area of Specialization	3+0	4.5
UKM702	Research in Area of Specialization	3+0	4.5

PROGRAM IN INORGANIC CHEMISTRY

PROGRAM

I.Semester				II.Semester			
KİM534	Organometallic Chemistry	3+0	7.5	KİM515	Complexes Chemistry	3+0	7.5
KİM583	Modern Analysis Methods I	3+0	7.5	KİM518	Selected Topics in Inorganic Chemistry II	3+0	7.5
	Seçmeli Dersler	--	15.0	KİM592	Seminar	3+0	7.5

					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
KİM790	Thesis	0+1	30.0	KİM790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

EKİM510 (Eng)	Organic Chemistry of Biomaterials	3+0	7.5
EKİM513	Gas Chromatography and Applications	2+1	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
KİM506	Polymer Chemistry	3+0	7.5
KİM509	Carbon-Carbon Bond Formation	3+0	7.5
KİM510	Advanced NMR Techniques	3+0	7.5
KİM511	Electrochemistry	3+0	7.5
KİM516	Physical Organic Chemistry	3+0	7.5
KİM517	Selected Topics in Inorganic Chemistry I	3+0	7.5
KİM521	Adsorption	3+0	7.5
KİM522	Bioanalytical Chemistry	3+0	7.5
KİM524	Bioinorganic Chemistry	3+0	7.5
KİM525	Quantum Chemistry	3+0	7.5
KİM526	Microwave Organic Synthesis	3+0	7.5
KİM529	Catalytic Chemistry	3+0	7.5
KİM533	Electroanalytical Chemistry	3+0	7.5
KİM535	Data Analysis in Chemistry	3+0	7.5
KİM536	Chromatographic Techniques	3+0	7.5
KİM537	Organic Macro Molecules	3+0	7.5
KİM539	Quantitative Structure Property Relationship	3+0	7.5
KİM550	Reagents In Organic Synthesis	3+0	7.5
KİM551	Sensors and Their Applications	3+0	7.5
KİM558	Biochromatography	3+0	7.5
KİM560	Alternative Reaction Systems	3+0	7.5
KİM561	Novel Tendencies in Liquid Chromatography	3+0	7.5
KİM562	Inorganic Polymers	3+0	7.5
KİM563	Natural Product Synthesis I	3+0	7.5
KİM564	Natural Product Synthesis II	3+0	7.5
KİM565	Literature Search in Chemistry	3+0	7.5
KİM566	Stereo Selective Reactions and Practical Approach	3+0	7.5
KİM567	Applications of Computational Chemistry	3+0	7.5
KİM568	Solvent-free Organic Synthesis	3+0	7.5
KİM569	Structure Determination of Organic Chemistry	3+0	7.5
KİM701	Physical Chemistry of Foods	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UKM701	Research in Area of Specialization	3+0	4.5
UKM702	Research in Area of Specialization	3+0	4.5

PROGRAM IN BIOCHEMISTRY

PROGRAM

I.Semester				II.Semester			
KİM571	Molecular and Cellular Biochemistry	3+0	7.5	KİM584	Modern Analysis Methods II	3+0	7.5
KİM583	Modern Analysis Methods I	3+0	7.5	KİM592	Seminar	3+0	7.5

	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

	III.Semester				**IV.Semester**		
KİM790	Thesis	0+1	30.0	KİM790	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

EKİM510 (Eng)	Organic Chemistry of Biomaterials	3+0	7.5
EKİM513	Gas Chromatography and Applications	2+1	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
KİM506	Polymer Chemistry	3+0	7.5
KİM509	Carbon-Carbon Bond Formation	3+0	7.5
KİM510	Advanced NMR Techniques	3+0	7.5
KİM511	Electrochemistry	3+0	7.5
KİM516	Physical Organic Chemistry	3+0	7.5
KİM517	Selected Topics in Inorganic Chemistry I	3+0	7.5
KİM521	Adsorption	3+0	7.5
KİM522	Bioanalytical Chemistry	3+0	7.5
KİM524	Bioinorganic Chemistry	3+0	7.5
KİM525	Quantum Chemistry	3+0	7.5
KİM526	Microwave Organic Synthesis	3+0	7.5
KİM529	Catalytic Chemistry	3+0	7.5
KİM533	Electroanalytical Chemistry	3+0	7.5
KİM535	Data Analysis in Chemistry	3+0	7.5
KİM536	Chromatographic Techniques	3+0	7.5
KİM537	Organic Macro Molecules	3+0	7.5
KİM539	Quantitative Structure Property Relationship	3+0	7.5
KİM550	Reagents In Organic Synthesis	3+0	7.5
KİM551	Sensors and Their Applications	3+0	7.5
KİM558	Biochromatography	3+0	7.5
KİM560	Alternative Reaction Systems	3+0	7.5
KİM561	Novel Tendencies in Liquid Chromatography	3+0	7.5
KİM562	Inorganic Polymers	3+0	7.5
KİM563	Natural Product Synthesis I	3+0	7.5
KİM564	Natural Product Synthesis II	3+0	7.5
KİM565	Literature Search in Chemistry	3+0	7.5
KİM566	Stereo Selective Reactions and Practical Approach	3+0	7.5
KİM567	Applications of Computational Chemistry	3+0	7.5
KİM568	Solvent-free Organic Synthesis	3+0	7.5
KİM569	Structure Determination of Organic Chemistry	3+0	7.5
KİM701	Physical Chemistry of Foods	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UKM701	Research in Area of Specialization	3+0	4.5
UKM702	Research in Area of Specialization	3+0	4.5

PROGRAM IN PHYSICAL CHEMISTRY

PROGRAM

	I.Semester				**II.Semester**		
KİM504	Chemical Kinetics	3+0	7.5	KİM513	Chemical Thermodynamics	3+0	7.5
KİM583	Modern Analysis Methods I	3+0	7.5	KİM592	Seminar	3+0	7.5

	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----
			30.0				30.0

	III.Semester				IV.Semester		
KİM790	Thesis	0+1	30.0	KİM790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

EKİM510 (Eng)	Organic Chemistry of Biomaterials	3+0	7.5
EKİM513	Gas Chromatography and Applications	2+1	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
KİM506	Polymer Chemistry	3+0	7.5
KİM509	Carbon-Carbon Bond Formation	3+0	7.5
KİM510	Advanced NMR Techniques	3+0	7.5
KİM511	Electrochemistry	3+0	7.5
KİM516	Physical Organic Chemistry	3+0	7.5
KİM517	Selected Topics in Inorganic Chemistry I	3+0	7.5
KİM521	Adsorption	3+0	7.5
KİM522	Bioanalytical Chemistry	3+0	7.5
KİM524	Bioinorganic Chemistry	3+0	7.5
KİM525	Quantum Chemistry	3+0	7.5
KİM526	Microwave Organic Synthesis	3+0	7.5
KİM529	Catalytic Chemistry	3+0	7.5
KİM533	Electroanalytical Chemistry	3+0	7.5
KİM535	Data Analysis in Chemistry	3+0	7.5
KİM536	Chromatographic Techniques	3+0	7.5
KİM537	Organic Macro Molecules	3+0	7.5
KİM539	Quantitative Structure Property Relationship	3+0	7.5
KİM550	Reagents In Organic Synthesis	3+0	7.5
KİM551	Sensors and Their Applications	3+0	7.5
KİM558	Biochromatography	3+0	7.5
KİM560	Alternative Reaction Systems	3+0	7.5
KİM561	Novel Tendencies in Liquid Chromatography	3+0	7.5
KİM562	Inorganic Polymers	3+0	7.5
KİM563	Natural Product Synthesis I	3+0	7.5
KİM564	Natural Product Synthesis II	3+0	7.5
KİM565	Literature Search in Chemistry	3+0	7.5
KİM566	Stereo Selective Reactions and Practical Approach	3+0	7.5
KİM567	Applications of Computational Chemistry	3+0	7.5
KİM568	Solvent-free Organic Synthesis	3+0	7.5
KİM569	Structure Determination of Organic Chemistry	3+0	7.5
KİM701	Physical Chemistry of Foods	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UKM701	Research in Area of Specialization	3+0	4.5
UKM702	Research in Area of Specialization	3+0	4.5

PROGRAM IN ORGANIC CHEMISTRY

PROGRAM

	I.Semester				II.Semester		
EKİM511	Advanced Organic Chemistry I	3+0	7.5	EKİM512	Advanced Organic Chemistry II	3+0	7.5

KİM569	Structure Determination of Organic Chemistry	3+0	7.5	EKİM514	Heterocyclic Chemistry	3+0	7.5
	Seçmeli Dersler	--	15.0	KİM592	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				**IV.Semester**			
KİM790	Thesis	0+1	30.0	KİM790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

EKİM510 (Eng)	Organic Chemistry of Biomaterials	3+0	7.5
EKİM513	Gas Chromatography and Applications	2+1	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
KİM501	Selected Topics in Organic Chemistry I	3+0	7.5
KİM502	Selected Topics in Organic Chemistry II	3+0	7.5
KİM506	Polymer Chemistry	3+0	7.5
KİM509	Carbon-Carbon Bond Formation	3+0	7.5
KİM510	Advanced NMR Techniques	3+0	7.5
KİM511	Electrochemistry	3+0	7.5
KİM516	Physical Organic Chemistry	3+0	7.5
KİM517	Selected Topics in Inorganic Chemistry I	3+0	7.5
KİM519	Heterocyclic Chemistry I	3+0	7.5
KİM520	Heterocyclic Chemistry II	3+0	7.5
KİM521	Adsorption	3+0	7.5
KİM522	Bioanalytical Chemistry	3+0	7.5
KİM524	Bioinorganic Chemistry	3+0	7.5
KİM525	Quantum Chemistry	3+0	7.5
KİM526	Microwave Organic Synthesis	3+0	7.5
KİM529	Catalytic Chemistry	3+0	7.5
KİM533	Electroanalytical Chemistry	3+0	7.5
KİM535	Data Analysis in Chemistry	3+0	7.5
KİM536	Chromatographic Techniques	3+0	7.5
KİM537	Organic Macro Molecules	3+0	7.5
KİM539	Quantitative Structure Property Relationship	3+0	7.5
KİM550	Reagents In Organic Synthesis	3+0	7.5
KİM551	Sensors and Their Applications	3+0	7.5
KİM558	Biochromatography	3+0	7.5
KİM560	Alternative Reaction Systems	3+0	7.5
KİM561	Novel Tendencies in Liquid Chromatography	3+0	7.5
KİM562	Inorganic Polymers	3+0	7.5
KİM563	Natural Product Synthesis I	3+0	7.5
KİM564	Natural Product Synthesis II	3+0	7.5
KİM565	Literature Search in Chemistry	3+0	7.5
KİM566	Stereo Selective Reactions and Practical Approach	3+0	7.5
KİM567	Applications of Computational Chemistry	3+0	7.5
KİM568	Solvent-free Organic Synthesis	3+0	7.5
KİM701	Physical Chemistry of Foods	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UKM701	Research in Area of Specialization	3+0	4.5
UKM702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF CHEMICAL ENGINEERING

Head : Prof.Dr. Nezihe AYAS

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester					II.Semester		
	Seçmeli Dersler	- -	30.0	KMH692	Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
			-----				-----
			30.0				30.0

III.Semester					IV.Semester		
DYS000	Qualifying Exam	0+0	0.0	KMH890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

V.Semester					VI.Semester		
KMH890	Thesis	0+1	30.0	KMH890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

VII.Semester					VIII.Semester		
KMH890	Thesis	0+1	30.0	KMH890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
KMH601	Stage Separation Processes I	3+0	7.5
KMH602	Stage Separation Processes II	3+0	7.5
KMH604	Petroleum Refinery Engineering	3+0	7.5
KMH605	Heterogeneous Reaction Kinetics and Reactor Design	3+0	7.5
KMH606	Advanced Mathematical Modeling in Chemical Engineering	3+0	7.5
KMH609	Synthetic Fuel Production By Thermochemical Methods	3+0	7.5
KMH611	Advanced Carbon Materials from Biomass	3+0	7.5
KMH613	Coal Technology	3+0	7.5
KMH615	Principles and Applications of Biocatalysis	3+0	7.5
KMH622	Mathematical Methods in Chemical Engineering II	3+0	7.5
KMH630	Numerical Methods in Chemical Engineering II	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UKH901	Research in Area of Specialization	5+0	7.5
UKH902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester	II.Semester

KMH513	Advanced Transport Phenomena	3+0	7.5	KMH501	Advanced Chemical Engineering Thermodynamics	3+0	7.5
KMH521	Mathematical Methods in Chemical Engineering I	3+0	7.5	KMH510	Advanced Reactor Design	3+0	7.5
	Seçmeli Dersler	--	15.0	KMH592	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
KMH790	Thesis	0+1	30.0	KMH790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
KMH505	Advanced Mass Transfer	3+0	7.5
KMH506	Advanced Process Control	3+0	7.5
KMH507	Advanced Heat Transfer	3+0	7.5
KMH509	Fuel and Energy	3+0	7.5
KMH511	Advanced Instrumental Analysis	3+0	7.5
KMH516	Physical Operations in Food Technologies	3+0	7.5
KMH517	Advanced Stoichiometry	3+0	7.5
KMH518	New and Renewable Energy Sources	3+0	7.5
KMH519	Advanced Fluid Mechanics	3+0	7.5
KMH520	Chromatographic Separation Processes	3+0	7.5
KMH523	Advandced Separations Processes	3+0	7.5
KMH524	Materials' Synthesis, Characterization and Applications	3+0	7.5
KMH525	Supercritical Fluid Extraction	3+0	7.5
KMH526	Membrane Separation Processes	3+0	7.5
KMH527	Electrochemical Engineering	3+0	7.5
KMH528	Fuel Cells	3+0	7.5
KMH529	Numerical Methods in Chemical Engineering I	3+0	7.5
KMH530	Design of Experiments in Chemical Engineering	3+0	7.5
KMH531	Bioseparation Engineering	3+0	7.5
KMH532	Biochemical Engineering	3+0	7.5
KMH533	Polymer Synthesis	3+0	7.5
KMH534	New Carbon Materials	3+0	7.5
KMH535	Porous Materials	3+0	7.5
KMH536	Advanced Concrete Admixtures	3+0	7.5
KMH537	Hydrogen Production from Biomass	3+0	7.5
KMH538	Geopolymers	3+0	7.5
KMH539 (Eng)	Materials and Fire	3+0	7.5
KMH540	Pharmaceutical Manufacturing Technologies	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UKH701	Research in Area of Specialization	3+0	4.5
UKH702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF LOGISTICS MANAGEMENT

Head : Prof.Dr. Gülsen Serap ÇEKEROL

LOGISTICS MANAGEMENT (DISTANCE LEARNING)

PROGRAM

I.Semester				II.Semester		
Seçmeli Dersler	- -	30.0	LOJ599	Term Project	3+0	0.0
				Seçmeli Dersler	--	30.0
		-----				-----
		30.0				30.0

Elective Courses

LOJ511	Carriage of Dangerous Goods	3+0	7.5
LOJ512	Supply Chain Design	3+0	7.5
LOJ513	Logistics Principles	3+0	7.5
LOJ514	Logistics Planning and Modelling	3+0	7.5
LOJ515	Transportation Economics	3+0	7.5
LOJ516	Coorporate Communictation In Logistics Bussinesses	3+0	7.5
LOJ517	Human Resources Strategies on Logistics Sector	3+0	7.5
LOJ518	Transportation Systems	3+0	7.5
LOJ519	Warehouse And Inventory Management	3+0	7.5
LOJ520	Logistics Practices	3+0	7.5
LOJ521	Digital Marketing	3+0	7.5
LOJ522	Coaching and Leadership Skills for Managers	3+0	7.5

DEPARMENT OF MECHANICAL ENGINEERING

Head : Prof.Dr. Oğuz ÇOLAK

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester				II.Semester		
Seçmeli Dersler	- -	30.0	MKM592	Seminar	3+0	7.5
				Seçmeli Dersler	--	22.5
		-----				-----
		30.0				30.0

III.Semester					IV.Semester			
DYS000	Qualifying Exam	0+0	0.0	MKM790	Thesis	0+1	30.0
			---				-----
			--				30.0

V.Semester					VII.Semester			
MKM790	Thesis	0+1	30.0	MKM790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

VIII.Semester			
MKM790	Thesis	0+1	30.0

			30.0

Elective Courses

MKM611	Artificial Intelligence in Mechanical Engineering Applications	3+0	7.5
MKM612	Micro-Nanoscale Heat Transfer	3+0	7.5
MKM613	Advanced Exergy Analysis of Energy Systems	3+0	7.5
MKM614	Automotive Control Systems	3+0	7.5
MKM616	Advanced Thermodynamics in Mechanical Engineering	3+0	7.5
MKM790	Thesis	0+1	30.0

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
MKM503	Academic Development	3+0	7.5	MAT517	Applied Mathematics	3+0	7.5
MKM522	Mechanical Behavior of Materials	3+0	7.5	MKM592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
MKM790	Thesis	0+1	30.0	MKM790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MKM501	Advanced Heat and Mass Transfer	3+0	7.5
MKM509	Machining Dynamics	3+0	7.5
MKM511	Advanced C++ Programming	3+0	7.5
MKM513	Experimental Methods for Fluid Dynamics	3+0	7.5
MKM514	Atomistic Simulation of Materials	3+0	7.5
MKM515	Renewable Energy Systems	3+0	7.5
MKM516	Additive Manufacturing Methods	3+0	7.5
MKM517	Computer Aided Analysis	3+0	7.5
MKM518	Sustainable Manufacturing	3+0	7.5
MKM519	Exergy and Entropy Analysis	3+0	7.5
MKM520	Computer Aided Engineering	3+0	7.5
MKM523	Vehicle Systems Design	3+0	7.5
MKM524	Smart Materials and Applications	3+0	7.5
MKM525	Superalloys	3+0	7.5
MKM526	Advanced Powerplant System Technologies and Applications	3+0	7.5
MKM527	Design for Manufacturing and Assembly	3+0	7.5
MKM528	Advanced Level Nondestructive Inspection Methologies	3+0	7.5
MKM529	Selected Topics In Mechanics	3+0	7.5
MKM530	Vehicle Control Systems	3+0	7.5
MKM532	Biomass and Bioenergy Systems	3+0	7.5
MKM533	Exergy Analysis in Mechanical Engineering	3+0	7.5
MKM534	Thermal System Design	3+0	7.5
MKM535	Advanced Fluid Mechanics in Mechanical Engineering	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UMK701	Research in Area of Specialization	3+0	4.5
UMK702	Research in Area of Specialization	3+0	4.5

(NON-THESIS) MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
MKM503	Academic Development	3+0	7.5	MAT517	Applied Mathematics	3+0	7.5
MKM522	Mechanical Behavior of Materials	3+0	7.5	MKM599	Term Project	3+0	0.0
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	22.5
			-----				-----
			30.0				30.0

Elective Courses

MKM501	Advanced Heat and Mass Transfer	3+0	7.5
MKM509	Machining Dynamics	3+0	7.5
MKM511	Advanced C++ Programming	3+0	7.5
MKM513	Experimental Methods for Fluid Dynamics	3+0	7.5
MKM514	Atomistic Simulation of Materials	3+0	7.5
MKM515	Renewable Energy Systems	3+0	7.5
MKM516	Additive Manufacturing Methods	3+0	7.5
MKM517	Computer Aided Analysis	3+0	7.5
MKM518	Sustainable Manufacturing	3+0	7.5
MKM519	Exergy and Entropy Analysis	3+0	7.5
MKM520	Computer Aided Engineering	3+0	7.5
MKM523	Vehicle Systems Design	3+0	7.5
MKM524	Smart Materials and Applications	3+0	7.5
MKM525	Superalloys	3+0	7.5
MKM526	Advanced Powerplant System Technologies and Applications	3+0	7.5
MKM527	Design for Manufacturing and Assembly	3+0	7.5
MKM528	Advanced Level Nondestructive Inspection Methologies	3+0	7.5
MKM529	Selected Topics In Mechanics	3+0	7.5
MKM530	Vehicle Control Systems	3+0	7.5
MKM532	Biomass and Bioenergy Systems	3+0	7.5
MKM533	Exergy Analysis in Mechanical Engineering	3+0	7.5
MKM534	Thermal System Design	3+0	7.5
MKM535	Advanced Fluid Mechanics in Mechanical Engineering	3+0	7.5

DEPARTMENT OF MATERIAL SCIENCE AND ENGINEERING

Head : Prof.Dr. Aydın DOĞAN

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester				II.Semester			
Seçmeli Dersler	- -	30.0	MLZ692	Seminar	3+0	7.5
				Seçmeli Dersler	--	22.5
		-----				-----
		30.0				30.0

	III.Semester				IV.Semester		
DYS000	Qualifying Exam	0+0	0.0	MLZ890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

	V.Semester				VI.Semester		
MLZ890	Thesis	0+1	30.0	MLZ890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

	VII.Semester				VIII.Semester		
MLZ890	Thesis	0+1	30.0	MLZ890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

CAM601	Ionic Diffusion in Oxide Based Glasses	3+0	7.5
CAM602	Glass Science and Technological Improvements	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MLZ601	Scanning Electron Microscopy and Chemical Analysis Techniques	3+0	7.5
MLZ602	Transmission Electron Microscope and Chemical Analysis Techniques	3+0	7.5
MLZ603	Special X-Ray Techniques and Their Applications	3+0	7.5
MLZ604	Inorganic Powder Synthesis Technologies	3+0	7.5
MLZ605	Sintering of Particulate Materials	3+0	7.5
MLZ607	Alloy Development-Principles, New Horizons and Extreme Applications	3+0	7.5
MLZ608	Polymer Rheology	3+0	7.5
MLZ609	Modeling of Polymer Composites Manufacturing Processes	3+0	7.5
MLZ610	Kinetics	3+0	7.5
MLZ611	Diffusion in Solids	3+0	7.5
MLZ612	Ferroelectric Materials and Devices	3+0	7.5
MLZ613	Crystal Anisotropy	3+0	7.5
MLZ614	Spintronic and Applications	3+0	7.5
MLZ615	Material and Energy Balance in Production	3+0	7.5
MLZ616	Colloid Chemistry and Reological Behaviour	3+0	7.5
MLZ617	Inorganic Pigments and Pigments Interactions	3+0	7.5
MLZ618	The Relationship between Structure and Properties in Industrial Glazes	3+0	7.5
MLZ619	Phase Transformation Mechanisms of Metals	3+0	7.5
MLZ621	Electrical and Magnetic Characterization	3+0	7.5
MLZ622	Porous Materials	3+0	7.5
MLZ623	Structural and Optical Characterization	3+0	7.5
MLZ651	Materials Science and Advanced Materials Technology	3+0	7.5
MLZ652	Fatigue and Creep Behaviour of Aircraft Materials	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UMM901	Research in Area of Specialization	5+0	7.5
UMM902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

	I.Semester				II.Semester		
MLZ501	The Structure-Property Relationships in Materials	3+0	7.5	MAT517	Applied Mathematics	3+0	7.5

	Seçmeli Dersler	--	22.5	MLZ502	Thermodynamic Applications in Material Science	3+0	7.5
				MLZ592	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				**IV.Semester**			
MLZ790	Thesis	0+1	30.0	MLZ790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

CAM513	Metallic Glasses	3+0	7.5
CAM514	Chemical Durability of Glasses	3+0	7.5
CAM515	Engineering Glasses	3+0	7.5
ENM501	Design and Analysis of Experiments	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MLZ503	Electrical Properties of Materials	3+0	7.5
MLZ505	Thermal Analysis of Polymeric Materials	3+0	7.5
MLZ506	Mathematical Methods in Polymer Science and Technology	3+0	7.5
MLZ507	Fundamentals of Polymer Engineering	3+0	7.5
MLZ508	Mechanics of Polymer-Based Laminated Composites	3+0	7.5
MLZ509	Advanced Composite Materials	3+0	7.5
MLZ510	Thin Film Production and Vacuum Technologies	3+0	7.5
MLZ511	Dielectric Materials and Devices	3+0	7.5
MLZ512	Applications of Crystallography	3+0	7.5
MLZ513	Raw Materials and Mineral Processing	3+0	7.5
MLZ514	The use of Glass Materials in Industry	3+0	7.5
MLZ515	Refractory Technology	3+0	7.5
MLZ516	Coating Techniques	3+0	7.5
MLZ517	X-Ray Diffraction Techniques in Materials Characterisation	3+0	7.5
MLZ518	Strengthening Mechanisms in Materials	3+0	7.5
MLZ519	Atomic Force Microscopy and Applications	3+0	7.5
MLZ521	Fracture Mechanics of Materials	3+0	7.5
MLZ522	Application of Electrochromic and Photochromic Polymers	3+0	7.5
MLZ523	Polymer Chemistry and Physics	3+0	7.5
MLZ524	Electrochemical Characterization of Conducting Polymer	3+0	7.5
MLZ525	Cutting Tool Materials	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UMM701	Research in Area of Specialization	3+0	4.5
UMM702	Research in Area of Specialization	3+0	4.5

(NON-THESIS) MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				**II.Semester**			
MLZ501	The Structure-Property Relationships in Materials	3+0	7.5	MAT517	Applied Mathematics	3+0	7.5
	Seçmeli Dersler	--	22.5	MLZ502	Thermodynamic Applications in Material Science	3+0	7.5
				MLZ599	Term Project	3+0	0.0
					Seçmeli Dersler	--	15.0
			-----				-----

		30.0	30.0

Elective Courses

CAM513	Metallic Glasses	3+0	7.5
CAM514	Chemical Durability of Glasses	3+0	7.5
CAM515	Engineering Glasses	3+0	7.5
ENM501	Design and Analysis of Experiments	3+0	7.5
MLZ503	Electrical Properties of Materials	3+0	7.5
MLZ505	Thermal Analysis of Polymeric Materials	3+0	7.5
MLZ506	Mathematical Methods in Polymer Science and Technology	3+0	7.5
MLZ507	Fundamentals of Polymer Engineering	3+0	7.5
MLZ508	Mechanics of Polymer-Based Laminated Composites	3+0	7.5
MLZ509	Advanced Composite Materials	3+0	7.5
MLZ510	Thin Film Production and Vacuum Technologies	3+0	7.5
MLZ511	Dielectric Materials and Devices	3+0	7.5
MLZ512	Applications of Crystallography	3+0	7.5
MLZ513	Raw Materials and Mineral Processing	3+0	7.5
MLZ514	The use of Glass Materials in Industry	3+0	7.5
MLZ515	Refractory Technology	3+0	7.5
MLZ516	Coating Techniques	3+0	7.5
MLZ517	X-Ray Diffraction Techniques in Materials Characterisation	3+0	7.5
MLZ518	Strengthening Mechanisms in Materials	3+0	7.5
MLZ519	Atomic Force Microscopy and Applications	3+0	7.5
MLZ521	Fracture Mechanics of Materials	3+0	7.5
MLZ522	Application of Electrochromic and Photochromic Polymers	3+0	7.5
MLZ523	Polymer Chemistry and Physics	3+0	7.5
MLZ524	Electrochemical Characterization of Conducting Polymer	3+0	7.5
MLZ525	Cutting Tool Materials	3+0	7.5

DEPARTMENT OF MATHEMATICS

Head : Prof.Dr. Hüseyin AZCAN

DOCTORATE DEGREE (PH.D)

PROGRAM

	I.Semester				**II.Semester**		
	Seçmeli Dersler	- -	30.0	MAT692	Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
			-----				-----
			30.0				30.0

	III.Semester				**IV.Semester**		
DYS000	Qualifying Exam	0+0	0.0	MAT890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

	V.Semester				**VI.Semester**		
MAT890	Thesis	0+1	30.0	MAT890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

VII.Semester				VIII.Semester			
MAT890	Thesis	0+1	30.0	MAT890	Thesis	0+1	30.0
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MAT601	Stability of Linear Systems	3+0	7.5
MAT602	Stability of Nonlinear Dynamical Systems	3+0	7.5
MAT603	Convex Analysis	3+0	7.5
MAT604	Topological Vector Spaces	3+0	7.5
MAT605	Differential Inclusions Theory	3+0	7.5
MAT606	Riemannian Geometry	3+0	7.5
MAT607	Topological Groups	3+0	7.5
MAT608	Analysis on Fractals	3+0	7.5
MAT609	Knot Theory	3+0	7.5
MAT610	Basic Topics of the Set Valued Analysis	3+0	7.5
MAT611	Introduction to Gauge Theory	3+0	7.5
MAT612	Fractals and Kaos	3+0	7.5
MAT613	Clifford Algebras	3+0	7.5
MAT614	Continuous Modules	3+0	7.5
MAT615	Compact Operators	3+0	7.5
MAT616	Fiber Bundles	3+0	7.5
MAT619	Vector Optimization I	3+0	7.5
MAT620	Vector Optimization II	3+0	7.5
MAT621	Metric Geometry	3+0	7.5
MAT622	Characteristic Classes	3+0	7.5
MAT623	Bochner Technique on Riemannian Manifolds	3+0	7.5
MAT624	Stability of Switched Linear Systems	3+0	7.5
MAT625	Generalized Functions	3+0	7.5
MAT626	Boundary Value Problems	3+0	7.5
MAT627	Antagonistic Differential Games	3+0	7.5
MAT628	Rings and Radicals	3+0	7.5
MAT629	Complex Analysis	3+0	7.5
MAT630	Hardy-Hilbert Space and its Operators	3+0	7.5
MAT632	Complex Geometry	3+0	7.5
MAT633	Measure Theory and Integral	3+0	7.5
MAT634	Compactness Theorems on Riemannian Manifolds	3+0	7.5
MAT635	Graph Theory	3+0	7.5
MAT636	Asymptotic Solutions of Differential Equations	3+0	7.5
MAT637	Fuchsian Groups	3+0	7.5
MAT639	Differentiol Topology	3+0	7.5
MAT641	Asymptotic Approximation of Integrals	3+0	7.5
MAT643	Introduction to the Theory of Elastic Waves	3+0	7.5
MAT645	Fractional Differential Equations I	3+0	7.5
MAT646	Fractional Differential Equations II	3+0	7.5
MAT647	Algorithmic Graph Theory	3+0	7.5
MAT649	Near-Rings	3+0	7.5
MAT651	Chotic Dynamical systems in Higher Dimensions	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UMT901	Research in Area of Specialization	5+0	7.5
UMT902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM IN ANALYSIS AND FUNCTIONS THEORY

PROGRAM

I.Semester				II.Semester			
MAT502	Analysis	3+0	7.5	MAT503	Topology	3+0	7.5
MAT532	Functional Analysis	3+0	7.5	MAT592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

III.Semester				IV.Semester			
MAT790	Thesis	0+1	30.0	MAT790	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MAT504	Differential Equations	3+0	7.5
MAT506	Reel Analysis	3+0	7.5
MAT507	Applied Mathematics I	3+0	7.5
MAT508	Applied Mathematics II	3+0	7.5
MAT509	Algebraic Topology I	3+0	7.5
MAT510	Algebraic Topology II	3+0	7.5
MAT511	Dynamical Systems I	3+0	7.5
MAT512	Dynamical Systems II	3+0	7.5
MAT513	Axiomatic Sets Theory	3+0	7.5
MAT517	Applied Mathematics	3+0	7.5
MAT520	Lie Algebras	3+0	7.5
MAT521	Geometric Topology	3+0	7.5
MAT523	Introduction to Riemann Geometry	3+0	7.5
MAT524	Geometry of Differantial Forms	3+0	7.5
MAT525	Equations of Mathematical Physics I	3+0	7.5
MAT526	Equations of Mathematical Physics II	3+0	7.5
MAT527	Numerical Solutions of Partial Differential Equations	3+0	7.5
MAT528	Optimization Methods I	3+0	7.5
MAT529	Optimization Methods II	3+0	7.5
MAT530	Introduction to the Theory of Nonlinear Optimization	3+0	7.5
MAT531	Tensor Analysis	3+0	7.5
MAT533	Differentiable Manifolds	3+0	7.5
MAT534	Selected Topics in Algebra	3+0	7.5
MAT535	Hyperbolic Geometry	3+0	7.5
MAT539	Fractal Geometry	3+0	7.5
MAT542	Game Theory	3+0	7.5
MAT545	Integral Equations I	3+0	7.5
MAT546	Integral Equations II	3+0	7.5
MAT547	Asymptotic Methods in Analysis	3+0	7.5
MAT548	Numerical Solutions of Ordinary Differential Equations	3+0	7.5
MAT549	Introduction to Graph Theory	3+0	7.5
MAT551	Ring and Module Theory	3+0	7.5
MAT552	Introduction to Mathematical Elasticity	3+0	7.5
MAT553	Fuzzy Set Theory	3+0	7.5
MAT554	Integral Transforms and Their Application	3+0	7.5
MAT555	Introduction to Chaotic Dynamical Systems	3+0	7.5
MAT556	Linear Programming	3+0	7.5
MAT558	Vector Analysis	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UMT701	Research in Area of Specialization	3+0	4.5
UMT702	Research in Area of Specialization	3+0	4.5

PROGRAM IN ALGEBRA AND NUMBERS THEORY

PROGRAM

I.Semester				II.Semester			
MAT502	Analysis	3+0	7.5	MAT503	Topology	3+0	7.5
	Seçmeli Dersler	--	22.5	MAT519	Algebra	3+0	7.5
				MAT592	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
MAT790	Thesis	0+1	30.0	MAT790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MAT504	Differential Equations	3+0	7.5
MAT506	Reel Analysis	3+0	7.5
MAT507	Applied Mathematics I	3+0	7.5
MAT508	Applied Mathematics II	3+0	7.5
MAT509	Algebraic Topology I	3+0	7.5
MAT510	Algebraic Topology II	3+0	7.5
MAT511	Dynamical Systems I	3+0	7.5
MAT512	Dynamical Systems II	3+0	7.5
MAT513	Axiomatic Sets Theory	3+0	7.5
MAT517	Applied Mathematics	3+0	7.5
MAT520	Lie Algebras	3+0	7.5
MAT521	Geometric Topology	3+0	7.5
MAT523	Introduction to Riemann Geometry	3+0	7.5
MAT524	Geometry of Differantial Forms	3+0	7.5
MAT525	Equations of Mathematical Physics I	3+0	7.5
MAT526	Equations of Mathematical Physics II	3+0	7.5
MAT527	Numerical Solutions of Partial Differential Equations	3+0	7.5
MAT528	Optimization Methods I	3+0	7.5
MAT529	Optimization Methods II	3+0	7.5
MAT530	Introduction to the Theory of Nonlinear Optimization	3+0	7.5
MAT531	Tensor Analysis	3+0	7.5
MAT533	Differentiable Manifolds	3+0	7.5
MAT534	Selected Topics in Algebra	3+0	7.5
MAT535	Hyperbolic Geometry	3+0	7.5
MAT539	Fractal Geometry	3+0	7.5
MAT542	Game Theory	3+0	7.5
MAT545	Integral Equations I	3+0	7.5
MAT546	Integral Equations II	3+0	7.5
MAT547	Asymptotic Methods in Analysis	3+0	7.5
MAT548	Numerical Solutions of Ordinary Differential Equations	3+0	7.5
MAT549	Introduction to Graph Theory	3+0	7.5
MAT551	Ring and Module Theory	3+0	7.5
MAT552	Introduction to Mathematical Elasticity	3+0	7.5
MAT553	Fuzzy Set Theory	3+0	7.5
MAT554	Integral Transforms and Their Application	3+0	7.5
MAT555	Introduction to Chaotic Dynamical Systems	3+0	7.5
MAT556	Linear Programming	3+0	7.5
MAT558	Vector Analysis	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UMT701	Research in Area of Specialization	3+0	4.5
UMT702	Research in Area of Specialization	3+0	4.5

PROGRAM IN GEOMETRY

PROGRAM

I.Semester				II.Semester			
MAT502	Analysis	3+0	7.5	MAT503	Topology	3+0	7.5
	Seçmeli Dersler	--	22.5	MAT519	Algebra	3+0	7.5
				MAT592	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
MAT790	Thesis	0+1	30.0	MAT790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MAT504	Differential Equations	3+0	7.5
MAT506	Reel Analysis	3+0	7.5
MAT507	Applied Mathematics I	3+0	7.5
MAT508	Applied Mathematics II	3+0	7.5
MAT509	Algebraic Topology I	3+0	7.5
MAT510	Algebraic Topology II	3+0	7.5
MAT511	Dynamical Systems I	3+0	7.5
MAT512	Dynamical Systems II	3+0	7.5
MAT513	Axiomatic Sets Theory	3+0	7.5
MAT517	Applied Mathematics	3+0	7.5
MAT520	Lie Algebras	3+0	7.5
MAT521	Geometric Topology	3+0	7.5
MAT523	Introduction to Riemann Geometry	3+0	7.5
MAT524	Geometry of Differantial Forms	3+0	7.5
MAT525	Equations of Mathematical Physics I	3+0	7.5
MAT526	Equations of Mathematical Physics II	3+0	7.5
MAT527	Numerical Solutions of Partial Differential Equations	3+0	7.5
MAT528	Optimization Methods I	3+0	7.5
MAT529	Optimization Methods II	3+0	7.5
MAT530	Introduction to the Theory of Nonlinear Optimization	3+0	7.5
MAT531	Tensor Analysis	3+0	7.5
MAT533	Differentiable Manifolds	3+0	7.5
MAT534	Selected Topics in Algebra	3+0	7.5
MAT535	Hyperbolic Geometry	3+0	7.5
MAT539	Fractal Geometry	3+0	7.5
MAT542	Game Theory	3+0	7.5
MAT545	Integral Equations I	3+0	7.5
MAT546	Integral Equations II	3+0	7.5
MAT547	Asymptotic Methods in Analysis	3+0	7.5
MAT548	Numerical Solutions of Ordinary Differential Equations	3+0	7.5
MAT549	Introduction to Graph Theory	3+0	7.5
MAT551	Ring and Module Theory	3+0	7.5
MAT552	Introduction to Mathematical Elasticity	3+0	7.5
MAT553	Fuzzy Set Theory	3+0	7.5
MAT554	Integral Transforms and Their Application	3+0	7.5
MAT555	Introduction to Chaotic Dynamical Systems	3+0	7.5
MAT556	Linear Programming	3+0	7.5
MAT558	Vector Analysis	3+0	7.5

TAÇ701	Thesis Research Study Course	3+0	7.5
UMT701	Research in Area of Specialization	3+0	4.5
UMT702	Research in Area of Specialization	3+0	4.5

PROGRAM IN TOPOLOGY

PROGRAM

I.Semester				II.Semester			
MAT502	Analysis	3+0	7.5	MAT503	Topology	3+0	7.5
	Seçmeli Dersler	--	22.5	MAT519	Algebra	3+0	7.5
				MAT592	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
MAT790	Thesis	0+1	30.0	MAT790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MAT504	Differential Equations	3+0	7.5
MAT506	Reel Analysis	3+0	7.5
MAT507	Applied Mathematics I	3+0	7.5
MAT508	Applied Mathematics II	3+0	7.5
MAT509	Algebraic Topology I	3+0	7.5
MAT510	Algebraic Topology II	3+0	7.5
MAT511	Dynamical Systems I	3+0	7.5
MAT512	Dynamical Systems II	3+0	7.5
MAT513	Axiomatic Sets Theory	3+0	7.5
MAT517	Applied Mathematics	3+0	7.5
MAT520	Lie Algebras	3+0	7.5
MAT521	Geometric Topology	3+0	7.5
MAT523	Introduction to Riemann Geometry	3+0	7.5
MAT524	Geometry of Differantial Forms	3+0	7.5
MAT525	Equations of Mathematical Physics I	3+0	7.5
MAT526	Equations of Mathematical Physics II	3+0	7.5
MAT527	Numerical Solutions of Partial Differential Equations	3+0	7.5
MAT528	Optimization Methods I	3+0	7.5
MAT529	Optimization Methods II	3+0	7.5
MAT530	Introduction to the Theory of Nonlinear Optimization	3+0	7.5
MAT531	Tensor Analysis	3+0	7.5
MAT533	Differentiable Manifolds	3+0	7.5
MAT534	Selected Topics in Algebra	3+0	7.5
MAT535	Hyperbolic Geometry	3+0	7.5
MAT539	Fractal Geometry	3+0	7.5
MAT542	Game Theory	3+0	7.5
MAT545	Integral Equations I	3+0	7.5
MAT546	Integral Equations II	3+0	7.5
MAT547	Asymptotic Methods in Analysis	3+0	7.5
MAT548	Numerical Solutions of Ordinary Differential Equations	3+0	7.5
MAT549	Introduction to Graph Theory	3+0	7.5
MAT551	Ring and Module Theory	3+0	7.5
MAT552	Introduction to Mathematical Elasticity	3+0	7.5
MAT553	Fuzzy Set Theory	3+0	7.5
MAT554	Integral Transforms and Their Application	3+0	7.5

MAT555	Introduction to Chaotic Dynamical Systems	3+0	7.5
MAT556	Linear Programming	3+0	7.5
MAT558	Vector Analysis	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UMT701	Research in Area of Specialization	3+0	4.5
UMT702	Research in Area of Specialization	3+0	4.5

PROGRAM IN APPLIED MATHEMATICS

PROGRAM

I.Semester				II.Semester			
MAT502	Analysis	3+0	7.5	MAT519	Algebra	3+0	7.5
MAT532	Functional Analysis	3+0	7.5	MAT592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

III.Semester				IV.Semester			
MAT790	Thesis	0+1	30.0	MAT790	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MAT504	Differential Equations	3+0	7.5
MAT506	Reel Analysis	3+0	7.5
MAT507	Applied Mathematics I	3+0	7.5
MAT508	Applied Mathematics II	3+0	7.5
MAT509	Algebraic Topology I	3+0	7.5
MAT510	Algebraic Topology II	3+0	7.5
MAT511	Dynamical Systems I	3+0	7.5
MAT512	Dynamical Systems II	3+0	7.5
MAT513	Axiomatic Sets Theory	3+0	7.5
MAT517	Applied Mathematics	3+0	7.5
MAT520	Lie Algebras	3+0	7.5
MAT521	Geometric Topology	3+0	7.5
MAT523	Introduction to Riemann Geometry	3+0	7.5
MAT524	Geometry of Differantial Forms	3+0	7.5
MAT525	Equations of Mathematical Physics I	3+0	7.5
MAT526	Equations of Mathematical Physics II	3+0	7.5
MAT527	Numerical Solutions of Partial Differential Equations	3+0	7.5
MAT528	Optimization Methods I	3+0	7.5
MAT529	Optimization Methods II	3+0	7.5
MAT530	Introduction to the Theory of Nonlinear Optimization	3+0	7.5
MAT531	Tensor Analysis	3+0	7.5
MAT533	Differentiable Manifolds	3+0	7.5
MAT534	Selected Topics in Algebra	3+0	7.5
MAT535	Hyperbolic Geometry	3+0	7.5
MAT539	Fractal Geometry	3+0	7.5
MAT542	Game Theory	3+0	7.5
MAT545	Integral Equations I	3+0	7.5
MAT546	Integral Equations II	3+0	7.5
MAT547	Asymptotic Methods in Analysis	3+0	7.5
MAT548	Numerical Solutions of Ordinary Differential Equations	3+0	7.5
MAT549	Introduction to Graph Theory	3+0	7.5
MAT551	Ring and Module Theory	3+0	7.5
MAT552	Introduction to Mathematical Elasticity	3+0	7.5

MAT553	Fuzzy Set Theory	3+0	7.5
MAT554	Integral Transforms and Their Application	3+0	7.5
MAT555	Introduction to Chaotic Dynamical Systems	3+0	7.5
MAT556	Linear Programming	3+0	7.5
MAT558	Vector Analysis	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UMİ701	Research in Area of Specialization	3+0	4.5
UMİ702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF ARCHITECTURE

Head : Prof.Dr. Hicran Hanım HALAÇ

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester				II.Semester			
Seçmeli Dersler	- -	30.0	MİM692	Seminar	3+0	7.5
				Seçmeli Dersler	--	22.5
		-----				-----
		30.0				30.0

III.Semester					IV.Semester			
DYS000	Qualifying Exam	0+0	0.0	MİM890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

V.Semester					VI.Semester			
MİM890	Thesis	0+1	30.0	MİM890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

VII.Semester					VIII.Semester			
MİM890	Thesis	0+1	30.0	MİM890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
KOR610	Conservation of Rural Architectural Heritage	3+0	7.5
KOR611	Accessibility of Historic Places and Buildings	3+0	7.5
KOR612	Cultural Landscapes	3+0	7.5
KOR613	New Touches to The Historical Texture	3+0	7.5
KOR614	Typological Readings in the Historical Environment	3+0	7.5
KOR615	Tangible and Intangible Cultural Heritage	3+0	7.5
KOR616	Cultural Heritage and Tourism	3+0	7.5
KOR617	Cultural Herıtage Consciousness, Awareness and Partıcıpatory Approaches	3+0	7.5
MİM601	Architectural Studio Research I	3+0	7.5

MİM602	Architectural Studio Research II	3+0	7.5
MİM603	Architectural Research Methods	3+0	7.5
MİM604	Architecture: Art, Science and Technology	3+0	7.5
MİM605	Sustainable Architecture	3+0	7.5
MİM606	Urban Space Design Quality	3+0	7.5
MİM607	The Tools and Quality Measurement Methods for Design	3+0	7.5
MİM613	Civic Space and Buildings	3+0	7.5
MİM614	Health Impact Assessment of Space	3+0	7.5
MİM615	Spatial Relationships and Architecture	3+0	7.5
MİM616	Bounderies of the House and Modernity	3+0	7.5
MİM617	Architecture and the Morphological Study	3+0	7.5
MİM618	History and Criticism of Contemporary Architecture	3+0	7.5
MİM619	Contemporary PProjects in Sustainable	3+0	7.5
MİM620	Universal Design	3+0	7.5
MİM621	Architecture and Housing	3+0	7.5
MİM622	Urban Acoustic Comfort	3+0	7.5
MİM623	Integrated Design Studio in Architectural Education	3+0	7.5
MİM624	Integrated Design Studio in Architectural Education II	3+0	7.5
MİM625	Current Issues in Contemporary Architecture	3+0	7.5
MİM626	Contemporary Approaches İnarchitectural Design	3+0	7.5
MİM628	Architecture and Intertextuality	2+0	7.5
PSİ606	Psychology in Architecture Design	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UMİ901	Research in Area of Specialization	5+0	7.5
UMİ902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM IN BUILDING DESIGN

PROGRAM

	I.Semester				II.Semester		
MİM531	Architectural Design Methods	3+0	7.5	MİM562	Architectural Design Studio II	2+2	7.5
MİM533	Methodologies in Architectural Design Research	3+0	7.5	MİM592	Seminar	3+0	7.5
MİM561	Architectural Design Studio I	2+2	7.5		*Seçmeli Dersler*	--	15.0
	Seçmeli Dersler	--	7.5				
			-----				-----
			30.0				30.0

	III.Semester				IV.Semester		
MİM790	Thesis	0+1	30.0	MİM790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
KOR504	Architectural History and Concepts	3+0	7.5
KOR506	Technics of Documentation	3+0	7.5

KOR517	History of Modern Turkish Architecture	3+0	7.5
KOR518	History of Anatolian Architecture	3+0	7.5
KOR519	Construction Techniques and Conservation Problems of Ottoman Architecture	3+0	7.5
KOR521	World Heritage Sites in Turkey	3+0	7.5
KOR534	SpecialTopics in Preservation	3+0	7.5
KOR536	Preservation Management	3+0	7.5
MİM501	Analysis in Architecture	3+0	7.5
MİM502	Criticism in Architecture	3+0	7.5
MİM503	Housing Problems and Policies	3+0	7.5
MİM504	Qualitative Values of Housing Areas	3+0	7.5
MİM505	Ecological Planning and Design	3+0	7.5
MİM509	Legal Aspects of Urban Planning	3+0	7.5
MİM511	Building Material Failures	3+0	7.5
MİM512	Administrative and Legal Aspects of Planning	3+0	7.5
MİM513	Computer Programming and Introduction to Architectural Practices	3+0	7.5
MİM514	User Interface Design	3+0	7.5
MİM516	Building Shell Design in Energy Efficient Buildings	3+0	7.5
MİM517	Architectural Precast	3+0	7.5
MİM518	Structure in Architecture	3+0	7.5
MİM519	Housing Architecture	3+0	7.5
MİM520	Architectural Steel	3+0	7.5
MİM521	Environmental Design	3+0	7.5
MİM523	Contemporary Interpretation of Traditional Turkish Houses	3+0	7.5
MİM525	Culture, House and Identity	3+0	7.5
MİM526	Computer Aided Architectural Analyses Techniques	3+0	7.5
MİM528	Using of Space around House and House Environment	3+0	7.5
MİM529	Urban Space and Handicapped People	3+0	7.5
MİM530	National and International Aspects of Urban Conservation and Renewal	3+0	7.5
MİM532	Urban Regeneration	3+0	7.5
MİM534	Designing of Housing Areas	3+0	7.5
MİM535	Urban Design Theory	3+0	7.5
MİM536	Rationalism in Architecture	3+0	7.5
MİM543	Building Material Experiments	3+0	7.5
MİM544	Architectural Design and Criticism	3+0	7.5
MİM545	Architecture Sociological Readings	3+0	7.5
MİM546	Readings of Modernity in the Context of Architecture	3+0	7.5
MİM547	Architecture Communication	3+0	7.5
MİM549	Accessibility	3+0	7.5
MİM553	Auditorium Acoustics	3+0	7.5
MİM554	Digital Design and Production in Architecture	3+0	7.5
MİM555	Immaterial Architecture and its Elements	3+0	7.5
MİM557	Design Principles of Room Acoustics	3+0	7.5
MİM565	21st Century Approaches in Architectural Design	3+0	7.5
MİM571	Advanced Human Factors in Aviation	3+0	7.5
MİM573	Design Process Approaches in Intersection of Architecture and Architecture Education	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UMİ701	Research in Area of Specialization	3+0	4.5
UMİ702	Research in Area of Specialization	3+0	4.5

PRESERVATION OF ARCHITECTURE

PROGRAM

I.Semester				II.Semester			
KOR523	Conservation Project I	2+2	7.5	KOR524	Conservation Project II	2+2	7.5
KOR525	Conservation History and Theories	3+0	7.5	MİM592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---

			30.0				30.0
	III.Semester				**IV.Semester**		
MİM790	Thesis	0+1	30.0	MİM790	Thesis	0+1	30.0
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
KOR504	Architectural History and Concepts	3+0	7.5
KOR506	Technics of Documentation	3+0	7.5
KOR517	History of Modern Turkish Architecture	3+0	7.5
KOR520	The Management of Cultural Heritage	3+0	7.5
KOR522	Housing During Republic Period	3+0	7.5
KOR527	Research and Documentation Methods in Protection	3+0	7.5
KOR528	Conservation of Modern Cultural Heritage	3+0	7.5
KOR530	Cultural Heritage Buildings and Their Adaptations to Contemporary Museum Function	3+0	7.5
KOR531	Typological Readings in Conservation	3+0	7.5
KOR535	Special Topics in Conservation	3+0	7.5
KOR536	Preservation Management	3+0	7.5
KOR539	Construction Techniques and Conservation Problems of Ottoman Architecture	3+0	4.5
KOR541	History of Anatolian Architecture	3+0	4.5
KOR543	World Heritage Sites in Turkey	3+0	7.5
MİM501	Analysis in Architecture	3+0	7.5
MİM502	Criticism in Architecture	3+0	7.5
MİM503	Housing Problems and Policies	3+0	7.5
MİM504	Qualitative Values of Housing Areas	3+0	7.5
MİM505	Ecological Planning and Design	3+0	7.5
MİM509	Legal Aspects of Urban Planning	3+0	7.5
MİM511	Building Material Failures	3+0	7.5
MİM512	Administrative and Legal Aspects of Planning	3+0	7.5
MİM513	Computer Programming and Introduction to Architectural Practices	3+0	7.5
MİM514	User Interface Design	3+0	7.5
MİM516	Building Shell Design in Energy Efficient Buildings	3+0	7.5
MİM517	Architectural Precast	3+0	7.5
MİM518	Structure in Architecture	3+0	7.5
MİM519	Housing Architecture	3+0	7.5
MİM520	Architectural Steel	3+0	7.5
MİM521	Environmental Design	3+0	7.5
MİM523	Contemporary Interpretation of Traditional Turkish Houses	3+0	7.5
MİM525	Culture, House and Identity	3+0	7.5
MİM526	Computer Aided Architectural Analyses Techniques	3+0	7.5
MİM528	Using of Space around House and House Environment	3+0	7.5
MİM529	Urban Space and Handicapped People	3+0	7.5
MİM530	National and International Aspects of Urban Conservation and Renewal	3+0	7.5
MİM532	Urban Regeneration	3+0	7.5
MİM534	Designing of Housing Areas	3+0	7.5
MİM535	Urban Design Theory	3+0	7.5
MİM536	Rationalism in Architecture	3+0	7.5
MİM543	Building Material Experiments	3+0	7.5
MİM544	Architectural Design and Criticism	3+0	7.5
MİM545	Architecture Sociological Readings	3+0	7.5
MİM546	Readings of Modernity in the Context of Architecture	3+0	7.5
MİM547	Architecture Communication	3+0	7.5
MİM553	Auditorium Acoustics	3+0	7.5
MİM554	Digital Design and Production in Architecture	3+0	7.5
MİM555	Immaterial Architecture and its Elements	3+0	7.5
MİM557	Design Principles of Room Acoustics	3+0	7.5
MİM565	21st Century Approaches in Architectural Design	3+0	7.5
MİM571	Advanced Human Factors in Aviation	3+0	7.5
MİM573	Design Process Approaches in Intersection of Architecture and Architecture Education	3+0	7.5

TAÇ701	Thesis Research Study Course	3+0	7.5
UMİ701	Research in Area of Specialization	3+0	4.5
UMİ702	Research in Area of Specialization	3+0	4.5

PROGRAM IN BUILDING CONSTRUCTION

PROGRAM

I.Semester				II.Semester			
MİM511	Building Material Failures	3+0	7.5	MİM560	Noise Control II	3+0	7.5
MİM559	Noise Control I	3+0	7.5	MİM592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

III.Semester				IV.Semester			
MİM790	Thesis	0+1	30.0	MİM790	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
KOR504	Architectural History and Concepts	3+0	7.5
KOR506	Technics of Documentation	3+0	7.5
KOR517	History of Modern Turkish Architecture	3+0	7.5
KOR518	History of Anatolian Architecture	3+0	7.5
KOR519	Construction Techniques and Conservation Problems of Ottoman Architecture	3+0	7.5
KOR521	World Heritage Sites in Turkey	3+0	7.5
KOR534	SpecialTopics in Preservation	3+0	7.5
KOR536	Preservation Management	3+0	7.5
MİM501	Analysis in Architecture	3+0	7.5
MİM502	Criticism in Architecture	3+0	7.5
MİM503	Housing Problems and Policies	3+0	7.5
MİM504	Qualitative Values of Housing Areas	3+0	7.5
MİM505	Ecological Planning and Design	3+0	7.5
MİM509	Legal Aspects of Urban Planning	3+0	7.5
MİM512	Administrative and Legal Aspects of Planning	3+0	7.5
MİM513	Computer Programming and Introduction to Architectural Practices	3+0	7.5
MİM514	User Interface Design	3+0	7.5
MİM515	Solar Energy in Architecture	3+0	7.5
MİM516	Building Shell Design in Energy Efficient Buildings	3+0	7.5
MİM517	Architectural Precast	3+0	7.5
MİM518	Structure in Architecture	3+0	7.5
MİM519	Housing Architecture	3+0	7.5
MİM520	Architectural Steel	3+0	7.5
MİM521	Environmental Design	3+0	7.5
MİM523	Contemporary Interpretation of Traditional Turkish Houses	3+0	7.5
MİM525	Culture, House and Identity	3+0	7.5
MİM526	Computer Aided Architectural Analyses Techniques	3+0	7.5
MİM528	Using of Space around House and House Environment	3+0	7.5
MİM529	Urban Space and Handicapped People	3+0	7.5
MİM530	National and International Aspects of Urban Conservation and Renewal	3+0	7.5
MİM532	Urban Regeneration	3+0	7.5
MİM534	Designing of Housing Areas	3+0	7.5
MİM535	Urban Design Theory	3+0	7.5
MİM536	Rationalism in Architecture	3+0	7.5

MİM541	Architectural Design Studio I	2+4	7.5
MİM543	Building Material Experiments	3+0	7.5
MİM544	Architectural Design and Criticism	3+0	7.5
MİM545	Architecture Sociological Readings	3+0	7.5
MİM546	Readings of Modernity in the Context of Architecture	3+0	7.5
MİM547	Architecture Communication	3+0	7.5
MİM549	Accessibility	3+0	7.5
MİM553	Auditorium Acoustics	3+0	7.5
MİM554	Digital Design and Production in Architecture	3+0	7.5
MİM555	Immaterial Architecture and its Elements	3+0	7.5
MİM557	Design Principles of Room Acoustics	3+0	7.5
MİM565	21st Century Approaches in Architectural Design	3+0	7.5
MİM571	Advanced Human Factors in Aviation	3+0	7.5
MİM573	Design Process Approaches in Intersection of Architecture and Architecture Education	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UMİ701	Research in Area of Specialization	3+0	4.5
UMİ702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF FASHION AND TEXTILE DESING

Head : Dr. Lecturer Şakir ÖZÜDOĞRU

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
MOD503	Fashion Theories and Trends	3+0	7.5	MOD523	Philosophy of Design	3+0	7.5
MOD536	Research Methods and Applications in Textile and Fashion Design	3+0	7.5	MOD592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
MOD790	Thesis	0+1	30.0	MOD790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MOD511	Intelligent Textiles and Clothing	3+0	7.5
MOD525	Experimental Printing Design	3+0	7.5
MOD526	Cultural Approaches in Fashion and Textile Desig	3+0	7.5
MOD527	Wearable Art	1+2	7.5
MOD528	Youth Subcultures and Fashion	3+0	7.5
MOD530	Creativity in Clothing Design	3+0	7.5
MOD531	Textile Surface Aplications in Wearable Art	1+2	7.5
MOD532	Sustainability in Textile and Fashion Design	3+0	7.5
MOD534	Natural Printing Applications in Wearable Art	1+2	7.5
MOD535	Digital Technologies for Textile and Garment Design	3+0	7.5

MOD537	Fiber Art	3+0	7.5
MOD538	Fashion Sociology	3+0	7.5
MOD539	Fashıon Desıgn Presentatıon and Graphıc Desıgn Relatıon	1+2	7.5
MOD541	Textile and Garment Comfort	3+0	7.5
MOD543	Applied Studies on Natural Dyeing	2+1	7.5
MOD545	Art and Fashion Concept in Design	3+0	7.5
MOD701	Research in Area of Specialization	3+0	4.5
MOD702	Research in Area of Specialization	3+0	4.5
TAÇ701	Thesis Research Study Course	3+0	7.5

DEPARTMENT OF FLIGHT TRAINING

Head : Prof.Dr. Öznur USANMAZ

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

	I.Semester				II.Semester		
PLT501	Aircraft Performance and Operation Analysis	3+0	7.5	PLT509	Advanced Flight Mechanics	3+0	7.5
PLT503	Aviation Research	3+0	7.5	PLT592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

	III.Semester				IV.Semester		
PLT790	Thesis	0+1	30.0	PLT790	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
HTK505	Multi-Criteria Decision-Making	3+0	7.5
PLT504	Aviation Safety Cases	3+0	7.5
PLT505	Statistical Methods in Aviation	3+0	7.5
PLT506	Airlines	3+0	7.5
PLT508	Aircraft Performance Optimization	3+0	7.5
PLT511	Aircraft Icing	3+0	7.5
PLT512	Data Science in Aviation	2+1	7.5
PLT513	Mathmematical Calculations in Aviation	3+0	7.5
PLT515	Aircraft Sequencing and Scheduling Modelling	3+0	7.5
PLT517	Forecasting Methods in Aviation Operations	3+0	7.5
PLT519	Machine Learning in Aeronautics	2+1	7.5
PLT521	Operations Research in Aviation	3+0	7.5
SHA535	Helicopter Theory and Flight Principles	3+0	7.5
SHA538	Flight Procedures And Airspace Design	3+0	7.5
SHA539	Advanced Aerodynamics	3+0	7.5
SHY508	Air Traffic Management	3+0	6.0
SHY517	Aviation Safety Management	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UPL701	Research in Area of Specialization	3+0	4.5
UPL702	Research in Area of Specialization	3+0	4.5

DEPARTMAN OF RAIL TRANSPORT ENGINEERING

Head : Prof.Dr. Ö. Mete KOÇKAR

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
MAT517	Applied Mathematics	3+0	7.5	RYL536	Introduction to Railway Systems II	3+0	7.5
RYL535	Introduction to Railway Systems I	3+0	7.5	RYL592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

III.Semester				IV.Semester			
RYL790	Thesis	0+1	30.0	RYL790	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

RYL502	Entity in Charge of Maintenance and Certification for Railway Vehicles	3+0	7.5
RYL503	Certification of Railway Vehicles	3+0	7.5
RYL504	Energy Management in Rail Systems	3+0	7.5
RYL505	Introduction to Railway Vehicle and Track Interaction	3+0	7.5
RYL506	Urban Rail Transit System Design and Livable Cities II	3+0	7.5
RYL507	Dynamics of Railway Systems	3+0	7.5
RYL508	Design of Experiment	3+0	7.5
RYL509	Diagnostics and Monitoring in Railway Systems	3+0	7.5
RYL510	Air Conditioning and Ventilation	3+0	7.5
RYL511	Urban Rail Transit System Design and Livable Cities I	3+0	7.5
RYL512	System Identification in Railway Systems	3+0	7.5
RYL513	Numerical Methods in Optimization	3+0	7.5
RYL514	Safety Management Systems	3+0	7.5
RYL515	Selected Topics in Vehicle Design I	3+0	7.5
RYL516	Special Topics in Fluid Mechanics	3+0	7.5
RYL517	Vehicle Suspension System Design	3+0	7.5
RYL518	Selected Topics in Vehicle Design II	3+0	7.5
RYL519	Traction Control in Rail Vehicles	3+0	7.5
RYL520	Vibration and Noise in Rail Systems	3+0	7.5
RYL521	Shell Structures	3+0	7.5
RYL522	Image Processing Applications in Rail Systems	3+0	7.5
RYL523	Tractive Systems	3+0	7.5
RYL524	Sensors and Actuators in Railway System	3+0	7.5
RYL525	Signal Processing in Railway Systems	3+0	7.5
RYL526	Corrosion and Surface Treatment	3+0	7.5
RYL527	Optimization in Railway Systems	3+0	7.5
RYL528	Durability of Railway Materials	3+0	7.5
RYL530	Transportation of Dangerous Goods on Railways	3+0	7.5
RYL531	Tribology of Wheel - Rail	3+0	7.5
RYL532	Electric Machines in Railway Systems	3+0	7.5
RYL533	Data Analysis and Machine Learning in Rail Systems	3+0	7.5
RYL534	High Voltage Technique	3+0	7.5
RYL537	Soil Improvement and Seismic Slope Stability Analysis	3+0	7.5

RYL538	Infrastructure and Soil Dynamics in Rail Systems	3+0	7.5
RYL539	Soil Investigation and Soil Mechanics in Risky Fields	3+0	7.5
RYL540	Transportation Economics	3+0	7.5
RYL541	Condition Assessment of Railway Ballast by Ground Penetratin Radar (GPR) Method	3+0	7.5
RYL542	Historical Development of Railways	3+0	7.5
RYL543	Field and Laboratory Tests of Soils Under Dynamic Loading	3+0	7.5
RYL544	Investigation of Railway Infrastructure by Nondestructive Condition Monitoring Methods	3+0	7.5
RYL545	Introduction to Finite Element Analysis	3+0	7.5
RYL546	Detection Methods of Railway Infrastructure Deformations, Maintenance and Renewal Methods	3+0	7.5
RYL548	Business Management in Railway Systems	3+0	7.5
RYL550	Integrated Logistics Management	3+0	7.5
RYL551	Railway Electrification	3+0	7.5
RYL552	Elastic Stability Analysis of Shells and Plates	3+0	7.5
RYL553	Deep Learning and Artificial Neural Networks	3+0	4.0
RYL554	Energy Efficiency in Railway Systems	3+0	7.5
RYL555	Decision Making Techniques	3+0	7.5
RYL556	Cost Analysis in Railway Systems	3+0	7.5
RYL557	Selected Topics in Railway Design	3+0	7.5
RYL558	High Speed Railways	3+0	7.5
RYL701	Research in Area of Specialization	3+0	4.5
RYL702	Research in Area of Specialization	3+0	4.5
TAÇ701	Thesis Research Study Course	3+0	7.5

DEPARTMENT OF RECREATION

Head :

DOCTORATE DEGREE (PH.D)

PROGRAM

	I.Semester				**II.Semester**		
	Seçmeli Dersler	- -	30.0	REK692	Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
			-----				-----
			30.0				30.0
	III.Semester				**IV.Semester**		
DYS000	Qualifying Exam	0+0	0.0	REK890-0	Thesis(Thesis Proposal)	0+1	30.0
			---				-----
			--				
							30.0
	V.Semester				**VI.Semester**		
REK890	Thesis	0+1	30.0	REK890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0
	VII.Semester				**VIII.Semester**		
REK890	Thesis	0+1	30.0	REK890	Thesis	0+1	30.0
			-----				-----

	30.0		30.0

Elective Courses

BES657	Physical Education and Sports far lndividuals with Special Needs	3+0	7.5
REK 629	Urban Life and Recreation	3+0	7.5
REK611	Rekreation Policies	3+0	7.5
REK613	Psycho-Social Issues In Leisure Research	3+0	7.5
REK615	Experimental Practicies in Recreation and Leisure Research	3+0	7.5
REK617	Technology Based Leisure	3+0	7.5
REK619	Risk Management in Recreation	3+0	7.5
REK621	Human Resource Management in Recreation	3+0	7.5
REK623	Leisure Experience Design and Management	3+0	7.5
REK625	Leisure Consumer Psychology and Behavior	3+0	7.5
REK627	Sustainability and Recreation	3+0	7.5
REK631	Health and First Aid	3+0	7.5
REK901	Research in Area of Specialization	5+0	7.5
REK902	Research in Area of Specialization	5+0	7.5
SYR601	New Trends in Recreation	3+0	7.5
SYR612	Modern Sport Marketing Applications	3+0	7.5
SYR617	Measuring Tool Development	3+0	7.5
SYR618	Recreational Leadership	3+0	7.5
SYR619	Leisure Economics and Applications	3+0	7.5
SYR629	Management in Therapeutic Recreation Services	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
REK511	Academic Writing, Publishing and Presentation Techniques	3+0	7.5	REK512	Statistical Decision Making and Data Analysis in Leisure Research	3+0	7.5
SYR513	Leisure and Recreation Analysis	3+0	7.5	REK592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
REK790	Thesis	0+1	30.0	REK790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

BES528	Planning and Evaluation in Physical Education Teaching	3+0	7.5
BES563	Health and Exercise	3+0	7.5
PZL532	Sport Marketing Management	3+0	7.5
REK513	Project Management Techniques	3+0	7.5
REK514	Commercial Recreation Industry	3+0	7.5
REK515	Recreation Research in Local Governments	3+0	7.5
REK516	Quality Management in Recreation	3+0	7.5
REK517	Gender and Sport	3+0	7.5
REK518	Employee Recration Studies	3+0	7.5
REK519	Recreation and Brand Management	3+0	7.5
REK520	Body Composition and Wellness	3+0	7.5
REK521	Customer relationship strategies in recreation	3+0	7.5
REK523	Motor Development and Physical Fitness in Individuals with Special Needs	3+0	7.5

REK701	Research in Area of Specialization	3+0	4.5
REK702	Research in Area of Specialization	3+0	4.5
SPY502	Sports Economy and Analysis	3+0	7.5
SYR516	Leisure Education in Theory and Practice	3+0	7.5
SYR517	Theoretical Approaches on Leisure	3+0	7.5
SYR519	Therapeutic Recreation Program and Practices	3+0	7.5
SYR520	TheTherapeutic Recreation Leadership	3+0	7.5
SYR522	Leisure and Ageing	3+0	7.5
SYR523	Leisure and Consumer Culture	3+0	7.5
SYR525	Leisure and Healthy Living	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5

DEPARTMENT OF CERAMIC ENGINEERING

Head : Prof.Dr. Servet TURAN

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester				II.Semester			
Seçmeli Dersler	-	30.0		SRM692	Seminar	3+0	7.5
	-				*Seçmeli Dersler*	--	22.5
		-----					-----
		30.0					30.0

III.Semester					IV.Semester		
DYS000	Qualifying Exam	0+0	0.0	SRM890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

V.Semester					VI.Semester		
SRM890	Thesis	0+1	30.0	SRM890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

VII.Semester					VIII.Semester		
SRM890	Thesis	0+1	30.0	SRM890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

CAM601	Ionic Diffusion in Oxide Based Glasses	3+0	7.5
CAM602	Glass Science and Technological Improvements	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MLZ601	Scanning Electron Microscopy and Chemical Analysis Techniques	3+0	7.5
MLZ602	Transmission Electron Microscope and Chemical Analysis Techniques	3+0	7.5
MLZ603	Special X-Ray Techniques and Their Applications	3+0	7.5
MLZ604	Inorganic Powder Synthesis Technologies	3+0	7.5
MLZ605	Sintering of Particulate Materials	3+0	7.5

MLZ606	Phase Transformation Reactions of Metals	3+0	7.5
MLZ607	Alloy Development-Principles, New Horizons and Extreme Applications	3+0	7.5
MLZ610	Kinetics	3+0	7.5
MLZ611	Diffusion in Solids	3+0	7.5
MLZ612	Ferroelectric Materials and Devices	3+0	7.5
MLZ613	Crystal Anisotropy	3+0	7.5
MLZ614	Spintronic and Applications	3+0	7.5
MLZ615	Material and Energy Balance in Production	3+0	7.5
MLZ616	Colloid Chemistry and Reological Behaviour	3+0	7.5
MLZ617	Inorganic Pigments and Pigments Interactions	3+0	7.5
MLZ618	The Relationship between Structure and Properties in Industrial Glazes	3+0	7.5
SRM604	Ceramic Sensors	3+0	7.5
SRM606	Structural Advanced Ceramics	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
USM901	Research in Area of Specialization	5+0	7.5
USM902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
MLZ501	The Structure-Property Relationships in Materials	3+0	7.5	MAT517	Applied Mathematics	3+0	7.5
SRM501	Ceramic Forming Techniques	3+0	7.5	MLZ502	Thermodynamic Applications in Material Science	3+0	7.5
	Seçmeli Dersler	--	15.0	SRM592	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
SRM790	Thesis	0+1	30.0	SRM790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

CAM513	Metallic Glasses	3+0	7.5
CAM514	Chemical Durability of Glasses	3+0	7.5
CAM515	Engineering Glasses	3+0	7.5
ENM501	Design and Analysis of Experiments	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MLZ504	Fracture Mechanics of Materials	3+0	7.5
MLZ509	Advanced Composite Materials	3+0	7.5
MLZ510	Thin Film Production and Vacuum Technologies	3+0	7.5
MLZ511	Dielectric Materials and Devices	3+0	7.5
MLZ512	Applications of Crystallography	3+0	7.5
MLZ513	Raw Materials and Mineral Processing	3+0	7.5
MLZ514	The use of Glass Materials in Industry	3+0	7.5
MLZ515	Refractory Technology	3+0	7.5
MLZ516	Coating Techniques	3+0	7.5
MLZ517	X-Ray Diffraction Techniques in Materials Characterisation	3+0	7.5
SRM502	Rheological Behavior of Ceramics	3+0	7.5
SRM510	High Temperature Properties of Ceramic Materials	3+0	7.5
SRM513	Making of Heavy-Clay Products	3+0	7.5
SRM517	Ceramic Body and Glaze	3+0	7.5
SRM520	Ceramic Tiles and Sanitary ware Production	3+0	7.5

SRM526	Ceramic-Metallic Thin Films and Coatings	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
USM701	Research in Area of Specialization	3+0	4.5
USM702	Research in Area of Specialization	3+0	4.5

(NON-THESIS) MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
MLZ501	The Structure-Property Relationships in Materials	3+0	7.5	MAT517	Applied Mathematics	3+0	7.5
SRM501	Ceramic Forming Techniques	3+0	7.5	MLZ502	Thermodynamic Applications in Material Science	3+0	7.5
	Seçmeli Dersler	--	15.0	SRM599	Term Project	3+0	0.0
					Seçmeli Dersler	--	15.0
			-----				-----
			30.0				30.0

Elective Courses

CAM513	Metallic Glasses	3+0	7.5
CAM514	Chemical Durability of Glasses	3+0	7.5
CAM515	Engineering Glasses	3+0	7.5
ENM501	Design and Analysis of Experiments	3+0	7.5
MLZ504	Fracture Mechanics of Materials	3+0	7.5
MLZ509	Advanced Composite Materials	3+0	7.5
MLZ510	Thin Film Production and Vacuum Technologies	3+0	7.5
MLZ511	Dielectric Materials and Devices	3+0	7.5
MLZ512	Applications of Crystallography	3+0	7.5
MLZ513	Raw Materials and Mineral Processing	3+0	7.5
MLZ514	The use of Glass Materials in Industry	3+0	7.5
MLZ515	Refractory Technology	3+0	7.5
MLZ516	Coating Techniques	3+0	7.5
MLZ517	X-Ray Diffraction Techniques in Materials Characterisation	3+0	7.5
SRM502	Rheological Behavior of Ceramics	3+0	7.5
SRM510	High Temperature Properties of Ceramic Materials	3+0	7.5
SRM513	Making of Heavy-Clay Products	3+0	7.5
SRM517	Ceramic Body and Glaze	3+0	7.5
SRM520	Ceramic Tiles and Sanitary ware Production	3+0	7.5
SRM526	Ceramic-Metallic Thin Films and Coatings	3+0	7.5

DEPARTMENT OF CIVIL AVIATION

Head : Prof.Dr. T. Hikmet KARAKOÇ

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester **II.Semester**

	Seçmeli Dersler	- -	30.0	SHA692	Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
DYS000	Qualifying Exam	0+0	0.0	SHA890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

V.Semester				VI.Semester			
SHA890	Thesis	0+1	30.0	SHA890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

VII.Semester				VIII.Semester			
SHA890	Thesis	0+1	30.0	SHA890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MLZ651	Materials Science and Advanced Materials Technology	3+0	7.5
MLZ652	Fatigue and Creep Behaviour of Aircraft Materials	3+0	7.5
SHA601	Airline Management	3+0	7.5
SHA602	Aircraft Dynamics	3+0	7.5
SHA604	Engineering Economic Analysis	3+0	7.5
SHA608	Optimization Methods in Flight Mechanics	3+0	7.5
SHA614	Airport Design	3+0	7.5
SHA615	Advanced Mechanical Vibrations	3+0	7.5
SHA617	Sliding Mode Control Theory	3+0	7.5
SHA618	Fault Tolerant Flight Control System Design	3+0	7.5
SHA619	Cogeneration -Combined Heat Power Systems	3+0	7.5
SHA620	Aircraft Performance and Operational Analysis II	3+0	7.5
SHA621	Advanced Gas Thermodynamics	3+0	7.5
SHA625	Fatigue of Thermal Barrier Coating Systems	3+0	7.5
SHA626	Genetic Algorithms and Applications of Control Systems	3+0	7.5
SHA627	Sizing of Propeller-Driven and Jet-Powered Aircraft	3+0	7.5
SHA628	Airspace Management	3+0	7.5
SHA629	Non-Destructive Inspection Methods for Aircraft Maintenance	3+0	7.5
SHA630	Current Issues in Gas Turbine Engine Combustion Systems	3+0	7.5
SHA631	Aerothermodynamic Optimization of Aircraft Propulsion Systems	3+0	7.5
SHA632	Free Flight Concept and Analysis	3+0	7.5
SHA633	Operational Risk Management in Aviation	3+0	7.5
SHA634	Project Management in Aviation	3+0	7.5
SHA635	Trending Topics in Unmanned Aerial Vehicle Technology	3+0	7.5
SHA636	New Approaches in Air Traffic Management	3+0	7.5
SHA637	Performance Analysis of Aero Engines	3+0	7.5
SHA638	Network, Fleet and Schedule Planning in Aviation	3+0	7.5
SHA640	Single Score Life Cycle Assessment (LCA)	3+0	7.5
SHA642	ICT Project Management for Airports	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
USİ901	Research in Area of Specialization	5+0	7.5
USİ902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
SHA557	Multidisciplinary Research Topics in Aviation	3+0	7.5	SHA556	Mathematical Programming in Air Transportation	3+0	7.5
	Seçmeli Dersler	--	22.5	SHA558	Current Issues in Sustainable Aviation	3+0	7.5
				SHA592	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
SHA790	Thesis	0+1	30.0	SHA790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MAT517	Applied Mathematics	3+0	7.5
SHA511	Aircraft Performance And Operation Analysis I	3+0	7.5
SHA539	Advanced Aerodynamics	3+0	7.5
SHA555	Airport Information and Communications Technology Service Management	3+0	7.5
SHA559	Human Factors in Aviation Operations	3+0	7.5
SHA560	Aerospace Materials	3+0	7.5
SHA562	Airline Management	3+0	7.5
SHA564	Mechanical Properties of Materials	3+0	7.5
SHA566	Human Factors in Aviation Operations	3+0	7.5
SHA568	Business Analytics and Data Analysis	3+0	7.5
SHA572	Safety Management in Aviation Operations	3+0	7.5
SHA576	Simulation for Airline and Airport Operations	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
USİ701	Research in Area of Specialization	3+0	4.5
USİ702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF SPORTS MANAGEMENT

Head : Assoc. Prof.Dr. Hakan KATIRCI

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester				II.Semester			
Seçmeli Dersler	- -	30.0	SYR692	Seminar	3+0	7.5
				Seçmeli Dersler	--	22.5
		-----				-----

			30.0				30.0

	III.Semester				**IV.Semester**		
DYS000	Qualifying Exam	0+0	0.0	SYR890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

	V.Semester				**VI.Semester**		
SYR890	Thesis	0+1	30.0	SYR890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

	VII.Semester				**VIII.Semester**		
SYR890	Thesis	0+1	30.0	SYR890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
SYR601	New Trends in Recreation	3+0	7.5
SYR610	Event Planning and Project Management	3+0	7.5
SYR611	Contemporary Approaches in Sport Management	3+0	7.5
SYR612	Modern Sport Marketing Applications	3+0	7.5
SYR614	Risk Management in Sport Organizations	3+0	7.5
SYR615	Stratagic Sport Communication	3+0	7.5
SYR617	Measuring Tool Development	3+0	7.5
SYR618	Recreational Leadership	3+0	7.5
SYR619	Leisure Economics and Applications	3+0	7.5
SYR621	Psycho-Social Issues In Leisure Research	3+0	7.5
SYR623	Strategic Human Resources Management and Applications	3+0	7.5
SYR625	Sustainability in Sport Management and Recreation	3+0	7.5
SYR627	Customer Relationship Management Strategies and Applications	3+0	7.5
SYR629	Management in Therapeutic Recreation Services	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
USY901	Research in Area of Specialization	5+0	7.5
USY902	Research in Area of Specialization	5+0	7.5

DOCTORATE DEGREE (PH.D)

PROGRAM

	I.Semester				**II.Semester**		
	Seçmeli Dersler	-	30.0	SYR692	Seminar	3+0	7.5
		-					
					Seçmeli Dersler	--	22.5
			-----				-----
			30.0				30.0

	III.Semester				**IV.Semester**		
DYS000	Qualifying Exam	0+0	0.0	SYR890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

V.Semester				VI.Semester			
SYR890	Thesis	0+1	30.0	SYR890	Thesis	0+1	30.0
			---				---
			30.0				30.0

VII.Semester				VIII.Semester			
SYR890	Thesis	0+1	30.0	SYR890	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
SYR601	New Trends in Recreation	3+0	7.5
SYR610	Event Planning and Project Management	3+0	7.5
SYR611	Contemporary Approaches in Sport Management	3+0	7.5
SYR612	Modern Sport Marketing Applications	3+0	7.5
SYR614	Risk Management in Sport Organizations	3+0	7.5
SYR615	Stratagic Sport Communication	3+0	7.5
SYR617	Measuring Tool Development	3+0	7.5
SYR618	Recreational Leadership	3+0	7.5
SYR619	Leisure Economics and Applications	3+0	7.5
SYR621	Psycho-Social Issues In Leisure Research	3+0	7.5
SYR623	Strategic Human Resources Management and Applications	3+0	7.5
SYR625	Sustainability in Sport Management and Recreation	3+0	7.5
SYR627	Customer Relationship Management Strategies and Applications	3+0	7.5
SYR629	Management in Therapeutic Recreation Services	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
USY901	Research in Area of Specialization	5+0	7.5
USY902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
REK501	Recreation Management and Techniques	3+0	7.5	PZL532	Sport Marketing Management	3+0	7.5
SPY501	Sport Management Approaches	3+0	7.5	SYR592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

III.Semester				IV.Semester			
SYR790	Thesis	0+1	30.0	SYR790	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
FİN528	Sport Finance	3+0	7.5
İŞL508	Human Resources Strategies and Applications	3+0	7.5
İŞL578	Sport and Facility Business	3+0	7.5

PZL533	Integrated Marketing Communications in Sport	3+0	7.5
SPY502	Sports Economy and Analysis	3+0	7.5
SYR512	Customer Relationship in Sport	3+0	7.5
SYR513	Leisure and Recreation Analysis	3+0	7.5
SYR514	Brand Management and Sports	3+0	7.5
SYR515	Recreation Project Management	3+0	7.5
SYR516	Leisure Education in Theory and Practice	3+0	7.5
SYR517	Theoretical Approaches on Leisure	3+0	7.5
SYR518	Research Methods and Applications in Sports Management and Recreation	3+0	7.5
SYR519	Therapeutic Recreation Program and Practices	3+0	7.5
SYR520	TheTherapeutic Recreation Leadership	3+0	7.5
SYR521	Sport Consumer Behaviors	3+0	7.5
SYR522	Leisure and Ageing	3+0	7.5
SYR523	Leisure and Consumer Culture	3+0	7.5
SYR525	Leisure and Healthy Living	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
USY701	Research in Area of Specialization	3+0	4.5
USY702	Research in Area of Specialization	3+0	4.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
REK501	Recreation Management and Techniques	3+0	7.5	PZL532	Sport Marketing Management	3+0	7.5
SPY501	Sport Management Approaches	3+0	7.5	SYR592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

III.Semester				IV.Semester			
SYR790	Thesis	0+1	30.0	SYR790	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
FİN528	Sport Finance	3+0	7.5
İŞL508	Human Resources Strategies and Applications	3+0	7.5
İŞL578	Sport and Facility Business	3+0	7.5
PZL533	Integrated Marketing Communications in Sport	3+0	7.5
SPY502	Sports Economy and Analysis	3+0	7.5
SYR512	Customer Relationship in Sport	3+0	7.5
SYR513	Leisure and Recreation Analysis	3+0	7.5
SYR514	Brand Management and Sports	3+0	7.5
SYR515	Recreation Project Management	3+0	7.5
SYR516	Leisure Education in Theory and Practice	3+0	7.5
SYR517	Theoretical Approaches on Leisure	3+0	7.5
SYR518	Research Methods and Applications in Sports Management and Recreation	3+0	7.5
SYR519	Therapeutic Recreation Program and Practices	3+0	7.5
SYR520	TheTherapeutic Recreation Leadership	3+0	7.5
SYR521	Sport Consumer Behaviors	3+0	7.5
SYR522	Leisure and Ageing	3+0	7.5
SYR523	Leisure and Consumer Culture	3+0	7.5
SYR525	Leisure and Healthy Living	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5

USY701	Research in Area of Specialization	3+0	4.5
USY702	Research in Area of Specialization	3+0	4.5

TEXTILE AND FASHION DESIGN DEPARTMENT

Head :

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

	I.Semester				II.Semester		
MOD503	Fashion Theories and Trends	3+0	7.5	MOD526	Cultural Approaches in Fashion and Textile Desig	3+0	7.5
MOD536	Research Methods and Applications in Textile and Fashion Design	3+0	7.5	MOD592	Seminar	3+0	7.5
	Seçmeli Dersler	--	15.0		*Seçmeli Dersler*	--	15.0
			---				---
			30.0				30.0

	III.Semester				IV.Semester		
MOD790	Thesis	0+1	30.0	MOD790	Thesis	0+1	30.0
			---				---
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MOD511	Intelligent Textiles and Clothing	3+0	7.5
MOD523	Philosophy of Design	3+0	7.5
MOD525	Experimental Printing Design	3+0	7.5
MOD527	Wearable Art	1+2	7.5
MOD528	Youth Subcultures and Fashion	3+0	7.5
MOD530	Creativity in Clothing Design	3+0	7.5
MOD531	Textile Surface Aplications in Wearable Art	1+2	7.5
MOD532	Sustainability in Textile and Fashion Design	3+0	7.5
MOD534	Natural Printing Applications in Wearable Art	1+2	7.5
MOD535	Digital Technologies for Textile and Garment Design	3+0	7.5
MOD537	Fiber Art	3+0	7.5
MOD538	Fashion Sociology	3+0	7.5
MOD539	Fashıon Desıgn Presentatıon and Graphıc Desıgn Relatıon	1+2	7.5
MOD541	Textile and Garment Comfort	3+0	7.5
MOD543	Applied Studies on Natural Dyeing	2+1	7.5
MOD545	Art and Fashion Concept in Design	3+0	7.5
MOD701	Research in Area of Specialization	3+0	4.5
MOD702	Research in Area of Specialization	3+0	4.5
TAÇ701	Thesis Research Study Course	3+0	7.5

DEPARTMENT OF AIRFRAME AND POWERPLANT MAINTENANCE

Head : Prof.Dr. Dilek TURAN

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester					II.Semester		
Seçmeli Dersler	- -	30.0	UGM692		Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
		-----					-----
		30.0					30.0

III.Semester					IV.Semester		
DYS000	Qualifying Exam	0+0	0.0	UGM890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

V.Semester					VI.Semester		
UGM890	Thesis	0+1	30.0	UGM890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

VII.Semester					VIII.Semester		
UGM890	Thesis	0+1	30.0	UGM890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MLZ652	Fatigue and Creep Behaviour of Aircraft Materials	3+0	7.5
SHA601	Airline Management	3+0	7.5
SHA602	Aircraft Dynamics	3+0	7.5
SHA604	Engineering Economic Analysis	3+0	7.5
SHA608	Optimization Methods in Flight Mechanics	3+0	7.5
SHA615	Advanced Mechanical Vibrations	3+0	7.5
SHA619	Cogeneration -Combined Heat Power Systems	3+0	7.5
SHA620	Aircraft Performance and Operational Analysis II	3+0	7.5
SHA621	Advanced Gas Thermodynamics	3+0	7.5
SHA625	Fatigue of Thermal Barrier Coating Systems	3+0	7.5
SHA629	Non-Destructive Inspection Methods for Aircraft Maintenance	3+0	7.5
SHA631	Aerothermodynamic Optimization of Aircraft Propulsion Systems	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UGM601	Environmental Impact of Commercial Aircraft	3+0	7.5
UGM603	Advanced Heat Transfer Calculations in Aviation	3+0	7.5
UGM605	Advanced Exergy Analysis in Aviation	3+0	7.5
UGM606	Fuel Flow Rate Prediction Models and Optimization for Commercial Aircraft	3+0	7.5
UGM607	Aircraft Performance Modelling and Parametric Optimization	3+0	7.5
UGM610	Thermoeconomic and Thermoenvironmental Optimization in Aviation	3+0	7.5
UGM612	Sustainable Aviation Fuels	3+0	7.5
UGM614	Finite Volume Method	3+0	7.5
UUG901	Research in Area of Specialization	5+0	7.5
UUG902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
SHA511	Aircraft Performance And Operation Analysis I	3+0	7.5	MAT517	Applied Mathematics	3+0	7.5
	Seçmeli Dersler	--	22.5	SHA539	Advanced Aerodynamics	3+0	7.5
				UGM592	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
UGM790	Thesis	0+1	30.0	UGM790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MLZ552	Materials Selection For Aircraft Structure	3+0	7.5
MLZ553	Mechanical Behavior of Composite Materials	3+0	7.5
MLZ554	Structure and Properties of Aircraft Materials	3+0	7.5
SHA513	Oil Analysis Program in Aircraft Maintenance	3+0	7.5
SHA515	The Effects of Construction Techniques Aircraft on Performances of Light	3+0	7.5
SHA531	Industrial Aerodynamics	3+0	7.5
SHA535	Helicopter Theory and Flight Principles	3+0	7.5
SHA537	Exergy Analysis	3+0	7.5
SHA541	Current Issues in Gas Turbine Engines	3+0	7.5
SHA543	Parametric Cycle Analysis of Aircraft Propulsion System	3+0	7.5
SHA547	Flight Tests and Instrumentation	3+0	7.5
SHA548	Experimental Aerodynamics Analysis for Incompressible Flow	3+0	7.5
SHA549	Gas Turbine Combustion	3+0	7.5
SHA550	Preliminary Design of Unmanned Air Vehicle and Its Propulsion System	3+0	7.5
SHA551	Airline Operations and Scheduling	3+0	7.5
SHA552	Experimental Methods and Data Processing Techniques for Turbomachinery	3+0	7.5
SHA553	Air-conditioning Systems for Aircraft	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
TER501	Advanced Thermodynamics	3+0	7.5
UGM501	Advanced Human Factors in Aviation	3+0	7.5
UGM510	Failure Analysis of Aircraft Structures	3+0	7.5
UGM511	Mathematical Programming and Aviation Applications	3+0	7.5
UGM512	Electric - Hybrid Propulsion Systems and Aviation Applications	3+0	7.5
UGM513	Propeller and Windmill Aerodynamics	3+0	7.5
UGM515	Advanced Manufacturing and Assembly Technology for Aircraft Materials	3+0	7.5
UGM517	Sustainability Analysis at Airports	3+0	7.5
UGM519	Batteries and Battery Systems	3+0	7.5
UGM521	Momentum and Heat Transfer	3+0	7.5
UGM523	Physical Ergonomics in Aviation	3+0	7.5
UUG701	Research in Area of Specialization	3+0	4.5
UUG702	Research in Area of Specialization	3+0	4.5

DEPARTMENT OF AIR FRAME AND POWERPLANT MAINTENANCE

Head :

DOCTORATE DEGREE (PH.D)

PROGRAM

I.Semester				II.Semester		
Seçmeli Dersler	- -	30.0	UGM692	Seminar	3+0	7.5
				Seçmeli Dersler	--	22.5
		-----				-----
		30.0				30.0

III.Semester					IV.Semester		
DYS000	Qualifying Exam	0+0	0.0	UGM890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

V.Semester					VI.Semester		
UGM890	Thesis	0+1	30.0	UGM890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

VII.Semester					VIII.Semester		
UGM890	Thesis	0+1	30.0	UGM890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MLZ652	Fatigue and Creep Behaviour of Aircraft Materials	3+0	7.5
SHA601	Airline Management	3+0	7.5
SHA602	Aircraft Dynamics	3+0	7.5
SHA604	Engineering Economic Analysis	3+0	7.5
SHA608	Optimization Methods in Flight Mechanics	3+0	7.5
SHA615	Advanced Mechanical Vibrations	3+0	7.5
SHA619	Cogeneration -Combined Heat Power Systems	3+0	7.5
SHA620	Aircraft Performance and Operational Analysis II	3+0	7.5
SHA621	Advanced Gas Thermodynamics	3+0	7.5
SHA625	Fatigue of Thermal Barrier Coating Systems	3+0	7.5
SHA629	Non-Destructive Inspection Methods for Aircraft Maintenance	3+0	7.5
SHA631	Aerothermodynamic Optimization of Aircraft Propulsion Systems	3+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UGM601	Environmental Impact of Commercial Aircraft	3+0	7.5
UGM603	Advanced Heat Transfer Calculations in Aviation	3+0	7.5
UGM605	Advanced Exergy Analysis in Aviation	3+0	7.5
UGM606	Fuel Flow Rate Prediction Models and Optimization for Commercial Aircraft	3+0	7.5
UGM607	Aircraft Performance Modelling and Parametric Optimization	3+0	7.5
UGM610	Thermoeconomic and Thermoenvironmental Optimization in Aviation	3+0	7.5
UGM612	Sustainable Aviation Fuels	3+0	7.5
UGM614	Finite Volume Method	3+0	7.5
UUG901	Research in Area of Specialization	5+0	7.5
UUG902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
SHA511	Aircraft Performance And Operation Analysis I	3+0	7.5	MAT517	Applied Mathematics	3+0	7.5
	Seçmeli Dersler	--	22.5	SHA539	Advanced Aerodynamics	3+0	7.5
				UGM592	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
UGM790	Thesis	0+1	30.0	UGM790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
MLZ552	Materials Selection For Aircraft Structure	3+0	7.5
MLZ553	Mechanical Behavior of Composite Materials	3+0	7.5
MLZ554	Structure and Properties of Aircraft Materials	3+0	7.5
SHA513	Oil Analysis Program in Aircraft Maintenance	3+0	7.5
SHA515	The Effects of Construction Techniques Aircraft on Performances of Light	3+0	7.5
SHA531	Industrial Aerodynamics	3+0	7.5
SHA535	Helicopter Theory and Flight Principles	3+0	7.5
SHA537	Exergy Analysis	3+0	7.5
SHA541	Current Issues in Gas Turbine Engines	3+0	7.5
SHA543	Parametric Cycle Analysis of Aircraft Propulsion System	3+0	7.5
SHA547	Flight Tests and Instrumentation	3+0	7.5
SHA548	Experimental Aerodynamics Analysis for Incompressible Flow	3+0	7.5
SHA549	Gas Turbine Combustion	3+0	7.5
SHA550	Preliminary Design of Unmanned Air Vehicle and Its Propulsion System	3+0	7.5
SHA551	Airline Operations and Scheduling	3+0	7.5
SHA552	Experimental Methods and Data Processing Techniques for Turbomachinery	3+0	7.5
SHA553	Air-conditioning Systems for Aircraft	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
TER501	Advanced Thermodynamics	3+0	7.5
UGM501	Advanced Human Factors in Aviation	3+0	7.5
UGM510	Failure Analysis of Aircraft Structures	3+0	7.5
UGM511	Mathematical Programming and Aviation Applications	3+0	7.5
UGM512	Electric - Hybrid Propulsion Systems and Aviation Applications	3+0	7.5
UGM513	Propeller and Windmill Aerodynamics	3+0	7.5
UGM515	Advanced Manufacturing and Assembly Technology for Aircraft Materials	3+0	7.5
UGM517	Sustainability Analysis at Airports	3+0	7.5
UGM519	Batteries and Battery Systems	3+0	7.5
UGM521	Momentum and Heat Transfer	3+0	7.5
UGM523	Physical Ergonomics in Aviation	3+0	7.5
UUG701	Research in Area of Specialization	3+0	4.5
UUG702	Research in Area of Specialization	3+0	4.5

NON-THESIS MASTER'S PROGRAM

DEPARTMENT OF REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEMS

Head : Prof.Dr. Saye Nihan ÇABUK

DOCTORATE DEGREE (PH.D)

PROGRAM

	I.Semester				II.Semester		
	Seçmeli Dersler	- -	30.0	UCS692	Seminar	3+0	7.5
					Seçmeli Dersler	--	22.5
			-----				-----
			30.0				30.0

	III.Semester				IV.Semester		
DYS000	Qualifying Exam	0+0	0.0	UCS890-0	Thesis (Thesis Proposal)	0+1	30.0
			---				-----
			--				30.0

	V.Semester				VI.Semester		
UCS890	Thesis	0+1	30.0	UCS890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

	VII.Semester				VIII.Semester		
UCS890	Thesis	0+1	30.0	UCS890	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ801	Thesis Research Study Course	3+0	7.5
UCS601	Use of GIS in Earth Sciences	3+0	7.5
UCS602	Earth Systems	3+0	7.5
UCS603	Advanced Photogeology	3+0	7.5
UCS604	Environmental Hydrogeology	3+0	7.5
UCS606	Hydraulics in Porous Media	3+0	7.5
UCS607	Advanced Technology Supported Archaeological and Architectural Documentation	3+0	7.5
UCS608	Multiple Criteria Stable Support System Applications in Disaster Management	3+0	7.5
UCS609	Use of Geographic Information Systems in the Applications of Seismic Microzoning and Urban Transformation	3+0	7.5
UCS610	Application of High Speed Ground Penetrating Radar to Ballast and Subsoil Inspections of Runways, Highways and Railways	3+0	7.5
UCS611	Use of Geographic Information Systems in the Planning of Earthquake Origin Risk/Damage Mitigation	3+0	7.5
UCS612	Modern Approaches to the City Planning	3+0	7.5
UCS613	Urban Conservation-Restoration	3+0	7.5
UCS614	Urban Regeneration	3+0	7.5
UCS615	Resource Inventory and Analysis	3+0	7.5

UCS616	Physical Principles of Energy and Matter Interactions in Remote Sensing	3+0	7.5
UCS617	Special Subject at Remote Sensing	3+0	7.5
UCS618	Network Analysis in Geographic Information Systems	3+0	7.5
UCS619	Spatial Hydrology	3+0	7.5
UCS620	Remote Sensing and Geographic Information Systems Applications for Mine Reclamation	3+0	7.5
UCS622	Basic Programming and Geometric Problems	3+0	7.5
UCS624	Airborne Laser Scanning (LIDAR) Systems	3+0	7.5
UCS626	Logistics Optimization	3+0	7.5
UCS628	National Standards, Legislations and Public Applications	3+0	7.5
UCS630	Geographical Information Applications for Water Resources Planning	3+0	7.5
UCS632	Government Projects and Spatial Relations in Turkey	3+0	7.5
UCS634	Property Law and Introduction to Land Survey Applications	3+0	7.5
UCS635	Satellite Image Processing	3+0	7.5
UCS636	Project Management in Geographic Information Systems	3+0	7.5
UCS637	Remote Sensing and Geographic Information Systems Studio I	6+4	7.5
UCS638	Remote Sensing and Geographic Information Systems Studio II	6+4	7.5
UCS639	Remote Sensing with Google Earth Engine Remote Sensing	3+0	7.5
UCS640	Gis Applications in Agriculture	3+0	7.5
UCS641	Deep learning in Remote Sensing	3+0	7.5
UCS642	Machine Learning Applications in Geographic Information Systems and Remote Sensing	3+0	7.5
UCS643	Advanced Geographic Information System Applications in Urban Climate Research	3+0	7.5
UCS901	Research in Area of Specialization	5+0	7.5
UCS902	Research in Area of Specialization	5+0	7.5

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
UCS533	Fundamentals of Mapping and Geographical Information Systems	3+0	7.5	UCS508	Interpretation and Analysis Techniques on Geographic Information Systems	3+0	7.5
	Seçmeli Dersler	--	22.5	UCS555	Theoretical Basics of Remode Sensing	3+0	7.5
				UCS592	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
UCS790	Thesis	0+1	30.0	UCS790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
İST533	Fundamentals Statistics	3+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UCS506	Methods of Numerical Analysis	3+0	7.5
UCS511	Remote Sensing and Geographic Information Systems Techniques in Disaster Management	3+0	7.5
UCS512	Special Topics in the Natural Resources Management with the Use of GIS	3+0	7.5
UCS513	Special Topics on City Information Systems	3+0	7.5
UCS514	Environmental Management and Integration With Geographical Information Systems	3+0	7.5
UCS519	Automated Mapping and Facility Management Systems	3+0	7.5
UCS527	Multicriteria Decision Making Methods	3+0	7.5

UCS534	Geostatistics	3+0	7.5
UCS535	Integration of Geographic Information Systems and Global Positioning Systems	3+0	7.5
UCS536	Remote Sensing	3+0	7.5
UCS537	Geographic Information Systems in Social Sciences	3+0	7.5
UCS538	Geographic Information Systems and Health	3+0	7.5
UCS542	Raster and Grid Modeling on Remote Sensing	3+0	7.5
UCS543	Applications of New Technologies in Geographic Information Systems	3+0	7.5
UCS544	Seismic Data Acquisition Techniques and Quality Control	3+0	7.5
UCS545	Bore-Hole Seismic Methods and Professional Software	3+0	7.5
UCS546	Seismic Tomography and Professional Software	3+0	7.5
UCS547	Seismic Surface Waves	3+0	7.5
UCS548	Data-Processing in Seismic Refraction Methods and Professional Software	3+0	7.5
UCS549	Data-Processing in Seismic Reflection Methods and Professional Software	3+0	7.5
UCS550	Seismic Interpretation and Professional Software	3+0	7.5
UCS551	Seismic Stratigraphy and Tectonics	3+0	7.5
UCS552	Satellite Technologies and Communication	3+0	7.5
UCS553	Satellite Managership	3+0	7.5
UCS554	Geodatabase	3+0	7.5
UCS557	Microzoning	3+0	7.5
UCS559	Spatial Statistics	3+0	7.5
UCS574	Map Production and Use	3+0	7.5
UCS576	Data Mining in Remote Sensing	3+0	7.5
UCS577	Basic Programming and Introduction to Python Language	3+0	7.5
UCS578	Digital Elevation Models and Applications	3+0	7.5
UCS701	Research in Area of Specialization	3+0	4.5
UCS702	Research in Area of Specialization	3+0	4.5

(NON-THESIS) MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
UCS533	Fundamentals of Mapping and Geographical Information Systems	3+0	7.5	UCS508	Interpretation and Analysis Techniques on Geographic Information Systems	3+0	7.5
	Seçmeli Dersler	--	22.5	UCS555	Theoretical Basics of Remode Sensing	3+0	7.5
				UCS599	Term Project	3+0	0.0
					Seçmeli Dersler	--	15.0
			-----				-----
			30.0				30.0

Elective Courses

İST533	Fundamentals Statistics	3+0	7.5
UCS506	Methods of Numerical Analysis	3+0	7.5
UCS511	Remote Sensing and Geographic Information Systems Techniques in Disaster Management	3+0	7.5
UCS512	Special Topics in the Natural Resources Management with the Use of GIS	3+0	7.5
UCS513	Special Topics on City Information Systems	3+0	7.5
UCS514	Environmental Management and Integration With Geographical Information Systems	3+0	7.5
UCS519	Automated Mapping and Facility Management Systems	3+0	7.5
UCS527	Multicriteria Decision Making Methods	3+0	7.5
UCS534	Geostatistics	3+0	7.5
UCS535	Integration of Geographic Information Systems and Global Positioning Systems	3+0	7.5
UCS536	Remote Sensing	3+0	7.5
UCS537	Geographic Information Systems in Social Sciences	3+0	7.5
UCS538	Geographic Information Systems and Health	3+0	7.5
UCS542	Raster and Grid Modeling on Remote Sensing	3+0	7.5
UCS543	Applications of New Technologies in Geographic Information Systems	3+0	7.5
UCS544	Seismic Data Acquisition Techniques and Quality Control	3+0	7.5

UCS545	Bore-Hole Seismic Methods and Professional Software	3+0	7.5
UCS546	Seismic Tomography and Professional Software	3+0	7.5
UCS547	Seismic Surface Waves	3+0	7.5
UCS548	Data-Processing in Seismic Refraction Methods and Professional Software	3+0	7.5
UCS549	Data-Processing in Seismic Reflection Methods and Professional Software	3+0	7.5
UCS550	Seismic Interpretation and Professional Software	3+0	7.5
UCS551	Seismic Stratigraphy and Tectonics	3+0	7.5
UCS552	Satellite Technologies and Communication	3+0	7.5
UCS553	Satellite Managership	3+0	7.5
UCS554	Geodatabase	3+0	7.5
UCS557	Microzoning	3+0	7.5
UCS559	Spatial Statistics	3+0	7.5
UCS574	Map Production and Use	3+0	7.5
UCS576	Data Mining in Remote Sensing	3+0	7.5
UCS577	Basic Programming and Introduction to Python Language	3+0	7.5
UCS578	Digital Elevation Models and Applications	3+0	7.5

PROGRAM IN REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEMS (DISTANCE LEARNING)

PROGRAM

I.Semester				II.Semester		
Seçmeli Dersler	-	30.0	UCS599	Term Project	3+0	0.0
	-					
				Seçmeli Dersler	--	30.0
		-----				-----
		30.0				30.0

Elective Courses

UCS556	Use of Geographic Information Systems in Planning	3+0	7.5
UCS558	Use of Geographic Information System in Local Governments	3+0	7.5
UCS560	Database Usage in Geographic Information Systems	3+0	7.5
UCS563	Geographical Information Standards and Basic Legislation	3+0	7.5
UCS564	Disaster Management	3+0	7.5
UCS565	Introduction to Geographic Information Systems	3+0	7.5
UCS566	Geographical Information System Applications in Disaster Management	3+0	7.5
UCS567	Introduction to Remote Sensing	3+0	7.5
UCS568	Statistical Applications in Geographical Information Systems	3+0	7.5
UCS569	Computer Aided Mapping	3+0	7.5
UCS571	Open Source Geographic Information Systems Applications	3+0	7.5
UCS573	Open Source Remote Sensing Applications	3+0	7.5
UCS575	Spatial Analysis	3+0	7.5
UCS582	Evaluation of Climatic Factors and Bioclimatic Comfort	3+0	7.5
UCS584	Introduction to Google Earth Engine	3+0	7.5
UCS586	Remote Sensing and Geographical Information System Applic. in Urban Climate Res.	3+0	7.5
UCS588	Machine Learning in Geographic Information Systems and Remote Sensing	3+0	7.5
UCS594	National Geographic Information System Data Themes and Institutional Applications	3+0	7.5

DEPARTMENT OF GEOSCIENCES

Head : Dr. Lecturer Muammer TÜN

MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
YBL501	Earth Sciences	3+0	7.5	YBL512	Earth Systems	3+0	7.5
	Seçmeli Dersler	--	22.5	YBL524	Introduction to Earthquake Engineering	3+0	7.5
				YBL592	Seminar	3+0	7.5
					Seçmeli Dersler	--	7.5
			-----				-----
			30.0				30.0

III.Semester				IV.Semester			
YBL790	Thesis	0+1	30.0	YBL790	Thesis	0+1	30.0
			-----				-----
			30.0				30.0

Elective Courses

ARK555	Geophysical Methods in Archeology: Archeogeophysics	3+0	7.5
FBE510	Ethics of Science and Research Techniques	2+0	7.5
FBE510-O	Ethics of Science and Research Techniques (Online)	2+0	7.5
TAÇ701	Thesis Research Study Course	3+0	7.5
UCS508	Interpretation and Analysis Techniques on Geographic Information Systems	3+0	7.5
UCS511	Remote Sensing and Geographic Information Systems Techniques in Disaster Management	3+0	7.5
UCS525	Digital Photogrametry	3+0	7.5
UCS527	Multicriteria Decision Making Methods	3+0	7.5
UCS533	Fundamentals of Mapping and Geographical Information Systems	3+0	7.5
UCS534	Geostatistics	3+0	7.5
UCS551	Seismic Stratigraphy and Tectonics	3+0	7.5
UCS555	Theoretical Basics of Remode Sensing	3+0	7.5
UCS601	Use of GIS in Earth Sciences	3+0	7.5
UCS604	Environmental Hydrogeology	3+0	7.5
UCS609	Use of Geographic Information Systems in the Applications of Seismic Microzoning and Urban Transformation	3+0	7.5
UCS611	Use of Geographic Information Systems in the Planning of Earthquake Origin Risk/Damage Mitigation	3+0	7.5
UCS617	Special Subject at Remote Sensing	3+0	7.5
UYB701	Research in Area of Specialization	3+0	4.5
UYB702	Research in Area of Specialization	3+0	4.5
YBL502	Geotechnical Earthquake Engineering	3+0	7.5
YBL503	Geophysical Methods in Civil and Environmental Engineering	3+0	7.5
YBL504	Shallow Marine Geophysics	3+0	7.5
YBL505	In-situ Testing and Evaluation	3+0	7.5
YBL506	Geosynthetics	3+0	7.5
YBL507	Experimental Soil Mechanics	3+0	7.5
YBL508	Theoritical Soil Mechanics and Soil Models	3+0	7.5
YBL509	Engineering Properties of Soils	3+0	7.5
YBL510	Groundwater Hydraulics	3+0	7.5
YBL511	Geological and Hydro-meteorological Hazard Analysis	3+0	7.5
YBL513	Project Preparation and Management	3+0	7.5
YBL514	Sustainability of Cities	3+0	7.5
YBL516	Geomorphology	3+0	7.5
YBL518	Soft Computing and Data Mining in Earth Sciences	3+0	7.5
YBL519	Introduction to Data Science with Python for Earth Sciences	3+0	7.5
YBL520	Spectral Analysis of Earthquake Waves	3+0	7.5
YBL521	Geotechnical Earthquake Engineering	3+0	7.5
YBL522	Numerical Methods in Geotechnical Engineering	3+0	7.5
YBL523	Active Faults of Turkey and Their Earthquake Potential	3+0	7.5
YBL525	Engineering Geology and Construction in Earth Sciences	3+0	7.5
YBL526	Hydrogeochemistry	3+0	7.5

YBL527	Advanced Applied Hydrogeology I	3+0	7.5
YBL528	Seismology	3+0	7.5
YBL529	System Identification and Structural Health Monitoring	3+0	7.5
YBL530	Structural Earthquake Engineering	3+0	7.5
YBL531	Potential Theory in Geophysics	3+0	7.5
YBL532	Geological Disasters	3+0	7.5
YBL533	Laboratory Methods in Earth Engineering I	3+0	7.5
YBL534	Geology for Civil and Environmental Engineers	3+0	7.5
YBL535	Laboratory Methods in Earth Engineering II	3+0	7.5
YBL536	Paleoseismology	3+0	7.5
YBL537	Advanced Volcanology	3+0	7.5
YBL538	Injection Applications in Earth Sciences	3+0	7.5
YBL540	The Earth's Physics and Lithosphere Dynamics	3+0	7.5
YBL542	Landslide Investigations and Mitigation	3+0	7.5
YBL544	Advanced Applied Hydrogeology II	3+0	7.5
YBL546	The Solution of the Inverse Problem in Geophysical Modelling	3+0	7.5

(NON-THESIS) MASTER OF SCIENCE (MS) DEGREE

PROGRAM

I.Semester				II.Semester			
YBL501	Earth Sciences	3+0	7.5	YBL512	Earth Systems	3+0	7.5
	Seçmeli Dersler	--	22.5	YBL524	Introduction to Earthquake Engineering	3+0	7.5
				YBL599	Semester Project	3+0	0.0
					Seçmeli Dersler	--	15.0
			-----				-----
			30.0				30.0

Elective Courses

ARK555	Geophysical Methods in Archeology: Archeogeophysics	3+0	7.5
UCS508	Interpretation and Analysis Techniques on Geographic Information Systems	3+0	7.5
UCS511	Remote Sensing and Geographic Information Systems Techniques in Disaster Management	3+0	7.5
UCS525	Digital Photogrametry	3+0	7.5
UCS527	Multicriteria Decision Making Methods	3+0	7.5
UCS533	Fundamentals of Mapping and Geographical Information Systems	3+0	7.5
UCS534	Geostatistics	3+0	7.5
UCS551	Seismic Stratigraphy and Tectonics	3+0	7.5
UCS555	Theoretical Basics of Remode Sensing	3+0	7.5
UCS601	Use of GIS in Earth Sciences	3+0	7.5
UCS604	Environmental Hydrogeology	3+0	7.5
UCS609	Use of Geographic Information Systems in the Applications of Seismic Microzoning and Urban Transformation	3+0	7.5
UCS611	Use of Geographic Information Systems in the Planning of Earthquake Origin Risk/Damage Mitigation	3+0	7.5
UCS617	Special Subject at Remote Sensing	3+0	7.5
YBL502	Geotechnical Earthquake Engineering	3+0	7.5
YBL503	Geophysical Methods in Civil and Environmental Engineering	3+0	7.5
YBL504	Shallow Marine Geophysics	3+0	7.5
YBL505	In-situ Testing and Evaluation	3+0	7.5
YBL506	Geosynthetics	3+0	7.5
YBL507	Experimental Soil Mechanics	3+0	7.5
YBL508	Theoritical Soil Mechanics and Soil Models	3+0	7.5
YBL509	Engineering Properties of Soils	3+0	7.5
YBL510	Groundwater Hydraulics	3+0	7.5
YBL511	Geological and Hydro-meteorological Hazard Analysis	3+0	7.5
YBL513	Project Preparation and Management	3+0	7.5
YBL514	Sustainability of Cities	3+0	7.5

YBL516	Geomorphology	3+0	7.5
YBL518	Soft Computing and Data Mining in Earth Sciences	3+0	7.5
YBL519	Introduction to Data Science with Python for Earth Sciences	3+0	7.5
YBL520	Spectral Analysis of Earthquake Waves	3+0	7.5
YBL521	Geotechnical Earthquake Engineering	3+0	7.5
YBL522	Numerical Methods in Geotechnical Engineering	3+0	7.5
YBL523	Active Faults of Turkey and Their Earthquake Potential	3+0	7.5
YBL525	Engineering Geology and Construction in Earth Sciences	3+0	7.5
YBL526	Hydrogeochemistry	3+0	7.5
YBL527	Advanced Applied Hydrogeology I	3+0	7.5
YBL528	Seismology	3+0	7.5
YBL529	System Identification and Structural Health Monitoring	3+0	7.5
YBL530	Structural Earthquake Engineering	3+0	7.5
YBL531	Potential Theory in Geophysics	3+0	7.5
YBL532	Geological Disasters	3+0	7.5
YBL533	Laboratory Methods in Earth Engineering I	3+0	7.5
YBL534	Geology for Civil and Environmental Engineers	3+0	7.5
YBL535	Laboratory Methods in Earth Engineering II	3+0	7.5
YBL536	Paleoseismology	3+0	7.5
YBL537	Advanced Volcanology	3+0	7.5
YBL538	Injection Applications in Earth Sciences	3+0	7.5
YBL540	The Earth's Physics and Lithosphere Dynamics	3+0	7.5
YBL542	Landslide Investigations and Mitigation	3+0	7.5
YBL544	Advanced Applied Hydrogeology II	3+0	7.5
YBL546	The Solution of the Inverse Problem in Geophysical Modelling	3+0	7.5

PROGRAM IN URBAN DEVELOPMENT RISK MANAGEMENT (DISTANCE LEARNING)

PROGRAM

I.Semester				II.Semester		
Seçmeli Dersler	-	30.0	KRY599	Semester Project	3+0	0.0
	-			*Seçmeli Dersler*	--	30.0
		-----				-----
		30.0				30.0

Elective Courses

KRY501	Introduction to Urban Risk Management	3+0	7.5
KRY502	Emergency and Disaster Regulations	3+0	7.5
KRY503	GIS and RS in Risk Management	3+0	7.5
KRY504	Microzonation for Municipalities	3+0	7.5
KRY505	Map Information and GIS	3+0	7.5
KRY506	Flood and Drought Hydrology	3+0	7.5
KRY507	Risk Evaluation During Urban Renewal Process	3+0	7.5
KRY508	Environmental Geology and Hydrogeology	3+0	7.5
KRY509	Risk Determination of Underground Structures	3+0	7.5
KRY510	Global Climate Change and Meteorological Disasters	3+0	7.5
KRY511	GIS Use in Resource Inventory and Analyses	3+0	7.5
KRY512	Urban Transformation Law	3+0	7.5
KRY513	Advanced Technologies in Disaster and Emergency Management	3+0	7.5
KRY514	Disaster Law	3+0	7.5
KRY515	Spatial Analysis in Urban Risk Management	3+0	7.5
KRY516	Earthquake Risk Determination in Reinforced-Concrete Buildings	3+0	7.5
KRY520	Disaster Hazard and Risk Factors of Turkey	3+0	7.5
KRY522	Disaster Regulation for Local Governments	3+0	7.5
KRY523	Disaster Logistics	3+0	7.5
KRY524	Sustainable Urban Resilience	3+0	7.5
KRY525	Urban Planning and Geology	3+0	7.5

KRY526	Rapid Seismic Performance Assessment Methods and Building Inventory Studies	3+0	7.5
KRY527	Combating and Adapting to Global Climate Change	3+0	7.5
KRY528	Combating and Adapting to Climate Change in Cities	3+0	7.5

COURSE CONTENTS

ANA501 Functional Anatomy 3+0 7.5

Basic Terminology of Kinesiology and Anatomy; Terms Related to Movement; Basic Anatomic Positions; Axis; Platform; Range of Motion; Tissue Mechanics; Neck Mechanics; Shoulder Mechanics; Thoracic Mechanics; Lumbar Mechanics; Hip Mechanics; Knee Mechanics; Mechanics of Resistance Training; Mechanics of Musculoskeletal Injuries; Mechanics of Running; Mechanics of Hitting; Mechanics of Kicking; Applications to Daily Life; Mechanics of Lifting; Mechanics of Balance; Gait Analysis; Mechanics of Footwear.

ANA503 Physiology I 3+0 7.5

Physiology I: Functional Control of Human Body; Cell; Structure, Organization and Function, Cell Membrane Structure and Function: Transport of Ions And Molecules Across The Cell Membrane; Membrane Potentials and Action Potentials; Stimulation and Skeletal Muscle Contraction; Stimulation Contraction and Smooth Muscle; Stimulation and Contraction of The Heart Muscle; Cardiovascular System and Regulation; Kidney and Body Fluids; Regulation of Acid-Base Balance; Carbohydrate, Lipid and Protein Metabolism.

ANA504 Physiology II 3+0 7.5

Physiology II: Respiratory and Regulation; Pulmonary Ventilation, Pulmonary Circulation, To the Pulmonary System of the Gas Diffusion Mechanism: Organization of the Nervous System; Sensory Receptors and Neuronal Circuits, Spinal Cord Motor Function and Control, Brain Sections and Control: Endocrine System, Endocrine System Hormones and Release Controls, Hormones of the Endocrine System Functions.

ARK546 Construction Elements in Archaic Age 3+0 7.5

Architectural Materials; Construction Techniques from Foundation to Roof; Masonry Systems; Functions of Construction Elements; Architectural Styles: Doric, Ionic, Corinth styles; Basic Characteristics and the Comparison of Greek and Roman Architecture; Analysis and Dating of Construction Elements.

ARK547 Architecture and Urbanization in Archaic Age 3+0 7.5

Greek and Roman Cities; Urbanization Approaches, Intra-muros in cities, Extramural elements; Defense systems, Sacred places, Temples, Altars, Propylons, Stoas, Bouleuterions, Agoras, Gymnasions, Theatres, Stadions, Houses, Water systems, Nymphaions, Baths, Latrines, City monuments; Necropolises.

ARK555 Geophysical Methods in Archeology: Archeogeophysics 3+0 7.5

General review of geophysical prospection methods in archeology: Gravity, magnetic, electric, electromagnetic, seismic and ground-penetrating-radar. Instrumentation, 2D/3D data-acquisition, data-quality-control, data-processing and data-interpretation. Shallow geophysical methods in sea, lake, swamp, dam, and stream environments: Underwater-cameras, high-resolution-seismic, multibeam-echosounder, side-scan-sonar techniques.

ARK567 Structural and Chemical Properties of Archaeological Structure Materials 3+0 7.5

General Information about Archaeological Materials; Ancient Mortar Technology and Mortar Production Methods; Aggregate and Binder Types; Structural and Chemical Properties of Mortars: Ancient brick and ceramic technology and production methods, Structural and chemical properties of brick and ceramic; Ancient Glass Technology and Production Methods: Types of glass found in archaeological excavations, Structural and chemical properties of glass materials; Ancient Metal Technology: Structural and chemical properties of archaeological metal finds.

ARY505 Scientific Research Planning and Evaluation 3+0 7.5

Scientific Research: Description of scientific research, Descriptive approaches, Qualitative differences according to scientific branches, Features of a scientific research, Determination techniques of scientific research problem; Resource Searching Methods in Scientific Research: Reaching to resource and techniques of evaluation, Data obtained for scientific research, Description of the reliable data; Using possibility of statistical techniques in evaluation of scientific research: The importance of body and contents relations on the interpretation of results, Writing types of research, How to show resources, Tabulation.

ARY524 Qualitative Research Design 3+0 7.5

Evaluating Shock Observations; Position of Qualitative Research Among Scientific Research; Comparing Qualitative and Quantitative Research Approaches; Data Collection Techniques in Qualitative Research: Observation, Document review, Interviews; Analyzing Qualitative Data; Ethics in Qualitative Studies; Difficulties Faced in Qualitative Studies; Keeping

Research Diary; Qualitative Research Design and Methods: Ethnography, Phenomenology, Building a theory, Case study, Action research; Qualitative Paper Assessment Criteria.

ARY535 Quantitative Research Methods 3+0 7.5

Basic Concepts in Statistics: Population, Sample, Sampling techniques; Parameter and Statistics; Variable Types; Measurement Levels; Quantitative Research Design and Analysis: Model selection, Reliability, Validity, Reliability and validity types and measures; Data Analysis: SPSS, Frequency distribution, Central tendency measurements, Propagation measurements, Standard scores; One and Two Tailed Tests; Type I and Type II Errors; Effect Size; Graphical Representations; Hypothesis Testing and Assumptions; t-Test: Single sample t-test, Independent samples t-test, Paired samples t-test; Variance Analysis: ANOVA, Correlation; Regression; Non-Parametric Statistics.

ARY621 Structural Equation Modeling 3+0 7.5

Introduction to Structural Equation Modeling; Chi Square; Factor Analysis; Regression; Confirmatory Factor Analysis; Fit Indices: General model fit, Comparative fit indices, Absolute fit indices, Robust fit indices, Residual based fit indice, Model comparision fit indices; Modification Indices; Path Analysis; Path Analysis With Latent Variables; Hybrit Models; Mediation; Moderation; Multigroup Structural Equation Modeling; Latent Growth Models.

ARY626 Qualitative Research Methods 3+0 7.5

Position of Qualitative Research Among Scientific Research; Comparing Qualitative and Quantitative Research Approaches; General Characteristics of Qualitative Research; Data Collection Techniques in Qualitative Research: Observation, Document review, Interviews; Ethics in Qualitative Studies; Difficulties Faced in Qualitative Studies; Keeping Research Diary; Reliability and Validity in Qualitative Studies; Giving Feedback to Interviewers; Qualitative Research Design and Methods: Ethnography, Phenomenology, Building a theory, Case study, Action research; Qualitative Paper Assessment Criteria.

BEL501 Terresterial Photogrammetry and Laser Scanning 2+2 7.5

Architectural Surveys and Survey Methods: Horizontal transformation, Photoplan, Surveys in excavation sites and archaeological protected areas, Survey of art works; Photogrammetric Applications for the Examination and Conservation of Historical Centers and Protected Areas: Plan and section, Digital analysis of historical centres, Documentation of historical monuments, Problems in photogrammetric documentation of monuments, Digital use of traditional photogrammetry on architectural objects; Using Photogrammetric Methods for Surveying Global Deposits: Digital opportunities for the survey of a single photo, Quantity in photogrammetry, Finance and practical applications; Architectural Photogrammetry Applications: Deformation, Displacement, Standards and methodology for building surveys, Optimization in architectural photogrammetry.

BEL505 Construction History Researches 3+0 7.5

History of Construction History Research; Works within the Scope of Construction History Research; Architectural Resources from the Archaic Age; Renaissance Period Resources; Modern Age Studies; Systematic Resource Evaluation; Evaluations of Disparities and Similarities; Research Methodology.

BEL507 Dating Methods Used in Archaeology 3+0 7.5

Definition of Dating; Importance of Dating Studies; Sample Groups Used in Dating Works and Their Properties; Dating Methods; Radioactive Methods (C14, Potassium-Argon, Uranium Series, ESR, OSL/TL, Fission Tracks); Non-Radioactive Methods (Dendrochronology, Obsidian Hydration, Varv Method); Comparative Evaluation of Dating Methods: Sampling, in Time periods, Measurement precision, etc.

BEL509 Dating by OSL/TL Methods 3+0 7.5

Luminescence Mechanism; Types of Luminescence: Optically stimulated, Thermal stimulated, Electroluminescence; Using Optically and Thermally Stimulated Luminescence Techniques as a Dating Method; OSL / TL Experimental Setup; Sampling Activities in the Archaeological Site; Sample Preparation Processes in the Laboratory; Equivalent Dose Measurement; Annual Dose Measurement; Equations and Approaches Used in Age Determination.

BEL511 Application of SEM and X-ray Analysis Techniques on Archaeological Samples 3+0 7.5

Scanning Electron Microscope (SEM) and Operating Mechanism; SEM Imaging; Sample Preparation Process for SEM Imaging of Archaeological Samples; Chemical Analysis by SEM (EDX, WDX); SEM Analysis of Archaeological Finds; X-Rays and Application Areas; Analysis of Archaeological Finds by X-Ray Diffraction (XRD) and X-Ray Fluorescence (XRF) Techniques; Interpretation of the Results of Sample Analysis.

BEL513 Archaeological Stratigraphy 4+0 7.5

Archaeology and stratigraphy; Stratigraphy and stratigraphic units; Archaeologic excavation; Stratigraphic theory: Strathigraphy, Principals of strathigraphy, stratigraphical series, Main concept of archaeological stratigraphy,

Archaeological deposits as stratigraphic units, Interfaces as stratigraphic units; Stratigraphic excavation and stratigraphy: Strategy and process of excavation, Documentation of stratigraphical excavation, Documentation of stratigraphic units, Documentation of archaeological finds, Stratigraphic sequence, Correlation of stratigraphical units, Formation of stratigraphic sequence, Evaluation of stratigraphic sequence in phases; Analysis: Evaluation of stratigraphic sequence and excavation results, Dating the archaeological finds and stratigraphic units.

BEL599 Term Project 3+0 0.0

BES504 Sport Medicine 3+0 7.5

The history of sport medicine and its importance; Assessment of athletes and general principles of measurement, Assessment of athletes in different sports and disabled persons and measurement methods ,Nutrition of athletes, Doping and doping control of athletes. Health knowledge and its education, Inspection of athlete's health, Game rules, Equipment of sport, Field of sports, Worming, Cooling and Stretching activities.

BES505 Protection Sport Accidents and Treatment Approaches 3+0 7.5

Reason of sport accidents, sport accidents according to sport branches, classification of sport accidents according to their reasons, First aid, Treatment of sport accidents, Education of returning in sport and its erections, Recovering in flexible tissue accidents, Flexible and strength Education, Rehabilitation in Racquet and ballistic sports, Accident in swimming, Accident in scuba, Accident in body building.

BES508 Exercise Physiology 3+0 7.5

Starting in Exercise Physiology, Acute Physiological conclusion of exercise, Chronic physiological adaptation to education, Basic education principles, Muscular Control of movement, Neurological control of movement, Neuromuscula radaptation to resistant education, Basic energy systems and metabolism, Hormonal responses toexercise, Metabolic adaptations to education, Hearth and Circulatorycontrolling in exercise, Respiration control and its organization, Heart and circulatory adaptations to education.

BES517 Sport Physiology 3+0 7.5

Exercise and thermoregulation; Hypobaric, Exercise in hyperbaric and microgrative setting, Boundaries of exercise education, Performance and ergojenic supplements, Nutrition, Optimal body weight for performance, Growing, Improvement and young athletes, Elderly and elderly athletes, Women athlete and gender difference, Exercise recipe, Obesity, Diabetic and Physical activity.

BES518 Physical Appropriateness 3+0 7.5

Definition of physical appropriateness and historical development, Physical appropriateness and education, Physical appropriateness criteria for general health, Physical appropriateness criteria for performance, Physical appropriateness for children, Physical appropriateness for elderly, Physical appropriateness criteria for disabilities person and physical appropriateness tests, European physical appropriateness norms and physical appropriateness tests, American physical appropriateness norms and physical appropriateness tests.

BES520 Experimental Applications in Sportive Performance 3+0 7.5

Experimental approach to sportive performance. Measurement and assessment of somatotype and body fat percentage. Measurement and assessment of speed performance, isokinetic strength, squat, countermovement and drop jump power. Use of photocell, anemometer and thermo-anemometer. Wingate test and use of Peak Bike. Conconi test and use of Polar heart rate monitor. Use of Lactate threshold field test and YSI lactate analyzer. Use of VO2max field test and K4b2 O2 analyzer. Motion analysis through image and use of SIMI motion analysis programme.

BES522 Experimental Approach to Exercise Neurophysiology 3+0 7.5

Elective: The Concept of Motor Unit. Functions of different motor units. Electromyography (EMG). Filtering and absolute values. Integration and normalization. Assessments of muscular fatigue, contraction and relaxion through EMG data. Assessment of reflexive muscular activity by EMG. Methods in brain research and measurement of electrical activity of the brain. Stimulated brain potentials: Assessment of attention and cognitive processes. Assessment of central fatigue by EEG.

BES526 Motivational Orientations in Sport 3+0 7.5

Motivational Orientations in Sports: The Dynamics of Motivation in Physical Activity; Motivation in Children's Development; Success in Sports and Target Research; Goal Setting in Sport and Physical Activity; As A Determinant of Exercise Self-Efficacy; Intrinsic and Extrinsic Motivation in Exercise and Sport; Motivational Strategies in Team and İndividual Sports; Fitness in the Perceptual Control.

BES528 Planning and Evaluation in Physical Education Teaching 3+0 7.5

Planning and Evaluation of Teaching Physical Education: Basic Concepts Related To Education; Teaching-Learning Process and Components: Teaching Purposes, The Selection of Content and Regulation, State Regulation of Education, Teaching Methods and Techniques, Instructional Strategies, Teaching Models, Teaching Tools and Materials, Evaluation of Student Achievement, Classroom Management.

BES530 Antioxidants and Athletics Performance 3+0 7.5

Concept of Free Radical: Structures and properties of free radicals, Production and metabolism of free radicals; Exercise and Oxidative stress: The effect of aerobic and anaerobic exercises on radical production and oxidative stress; The Antioxidant Defense System: Production of free radicals and cellular defense, Enzymatic and non-enzymatic antioxidants, Vitamins as antioxidants, Reversible and irreversible reactions of antioxidants, Nutrient source of antioxidants; Antioxidants Supplementations and Performance: Positive and negative effects of antioxidant supplements on athletic performance, Pro-oxidant effect of antioxidants.

BES531 Exercise and Sport Psychology 3+0 7.5

Exercise and Sport Psychology: The Emergence of the Concept of Sport and Exercise Psychology; Sports Psychology Related Concepts; Exercise and Sport Psychology of Relationships With Each Other; Of The Stages of Sport and Exercise Psychology; Exercise and Sport Psychology Has Undergone An Evolutionary Process of Knowledge; Affecting the Performance of Exercise and Sport Psychology Psychic Elements; Applications in Order To Increase Performance.

BES533 Introduction to Research Methods and Technics in Sports 3+0 7.5

Introduction to Research Methods and Technics in Sports: Methods and Techniques of Scientific Research in Sport; Should Be in A Scientific Research on the Content and Format of Knowledge, Skills, Attitudes and Behaviors; Research Problems, Objectives and Sub-Objectives, Importance and Assumptions; Research Models Frequently Used in the Field of Sports; To Be Considered in the Research Process, Ethical Principles, Rights and Responsibilities.

BES535 Movement Science and Performance Training 3+0 7.5

Performance Training: New approaches on performance training; Programming performance training for individual and team sports; Evaluating the sports performance at the laboratory and field environment; Motion: Motion forms; Motions performed that two and three dimensions; Theoretical approaches and modern systems on motion analysis; Processes of motion analysis; Using required tools of motion analysis; Examining of sports techniques via motion analysis: Specific motion analysis of individual and team sports; Examining training effects via motion analysis system; Reporting the outcomes of motion analysis on training effects.

BES536 Evaluation of Physical and Motor Fitness in School 2+1 7.5

Physical Fitness: Health-related physical fitness, The cardio-respiratory component, The musculoskeletal component, The morphological component, The motor component; Relationship Between BMI, Physical Fitness and Motor Skills; Assessment of Physical Activity Levels; Assessment of Physical Fitness: Existing field-based physical fitness test batteries for children and adolescents, EUROFIT battery of tests, FITNESSGRAM battery of tests, the ALPHA-FIT battery of tests, Brockport battery of tests.

BES538 Laboratory Experiences in Functional Evaluation of Skeletal Muscle 2+1 7.5

Anthropometry Applications; Electromyography (EMG) Applications; Kinematic Analysis Applications; Vibration Applications; Electromyostimulation (Electro-muscle stimulation) (EMS) Applications; Force Plate Measurement Applications; Pedobarography Measurement Applications; Hand Grip Pressure Applications; Isokinetic Dynamometer Applications; Hand Dynamometer Applications; Back Leg Chest Dynamometer Applications; Wingate Test Applications; Treadmill and Bicycle Ergometer Exercise Test Applications (Cardiopulmonary Exercises).

BES539 Motor Control of Human Movement 3+0 7.5

Basic Concepts of Motor Control; Perspectives of Neuroscience: Components of the nervous system, Nervous System, Neurons and Synapses as an Elaborate Communications Network:, Sensory and effector systems for movement, Motor control functions of the spinal cord and brain, Integrative brain mechanisms for movement; Basic Concepts of Motor Control: Cognitive Science Perspectives, models Used for motor control Studies, Motor Control Changes throughout the Life Span: Changes in observable motor Peformance, neurophysiological and information processing, Motor Control Adaptations to Training: Factors affecting the learning of motor skills.

BES540 Physical Activity and Health in Schools 3+0 7.5

Physical Activity: Determination of the level of physical activity, Recommendations on physical activity; The Effects of Physical Activity on Health at Different Levels; Physical Fitness: Components of Physical Fitness; Nutrition Level and Body Composition; Physical Activity and Physical Fitness for Schoolchildren and Adolescents; Physical Activity in Special Groups; Physical Fitness Through Physical Education and the Establishment of Physical Activity.

BES541 Comparative Physical Education 3+0 7.5

Historical Development of Physical Education in Turkey; Physical Education Concepts, Standards and Practices in Schools and Higher Education Institutions in Turkey; The Structure and Functioning of Physical Education Practices in Various Countries; The Similarities and Differences Between Physical Education Practices of Various Countries by Comparing/Contrasting them with Our Country; General Aspects and Evaluations.

BES544 Recreation Programs in Schools 3+0 7.5

Curriculum Development in Education: Types of education, Teaching, Learning, Education and teaching program, Curriculum Development in Historical View, Curriculum development in the scope of needs of society and individuals; Types of education; Recreational Activities in Schools: Classification of recreation activities according to different approaches, Recreational sports: Club sports, Extramural sports, Intramural sports, Informal sports, Instructional sports; Programming Concept in Recreation: History, Philosophy, Service Systems; Relationship Between Education and Leisure: History of leisure education, Leisure education need in society.

BES546 Recreation and Sport Practices for the People with Disabilities 3+0 7.5

The Meaning and Importance of Recreation and Sport for the People with Disabilities; Variety, Reasons and Classification of the People with Disabilities; The Effects of Recreative Activities and Sport for the People with Disabilities; Sport and Recreative Activities: Recreation and sport practices for the people with intellectual disabilities, Recreation and sport practices for the people with orthopedic disabilities, Recreation and sport practices for the people with visual impairments, Recreation and sport practices for the people with hearing impairments; Examination of the Literature of Recreation and Sport Practices for the People with Disabilities.

BES555 Analysis of Sportive Technique 3+0 7.5

The Concept and Mechanics of Movement: Axes and Planes in Defining Movement, Kinetic and Kinematic Variables, the Concepts of Technique and Skill; Analysing Technique with Qualitative Methods: Video based Data Recording and Observation, Establishing Strengths and Weaknesses of the Technique, Giving Feedback on the Ideal Technique; Analysing Technique with Quantitative Methods: Synchronizing High speed Cameras, Surface Electromyography, Force Plate etc., Dividing Sport Specific Technical Skills into Phases, Analysing Technique with Basic Kinetic and Kinematic Methods.

BES556 Training Periodization in Team Sports 3+0 7.5

Periodization in Team Sports: Basic and history of periodization, The importance of periodization; Types of Periodization; Linear periodization, Undulated periodization, Block periodization; Load and Recovery Relationship of Training: General adaptation syndrome, Fitness-fatigue model; Periodization of Different Periods: Daily, Weekly, Termly, Yearly periodization; Periodization of Different Conditioning Parameters: Periodization of strength, speed and endurance.

BES557 Periodization Methodologies in Football 3+0 7.5

The Importance of Tactical Periodization: what is tactical periodization, What is importance in football; Methodology of Tactical Periodization: Principle of specificity, Principle of making tactical principles of play operational, Principle of disassembly and hierarchical organization of principles of play, Principle of horizontal alternation in specificity, Principle of complex progression, Principle of performance stabilization; Small-sided Games in Football: Changes of Number of players, Field size, Rules of games vs., effects on conditional parameters; Block Periodization: Six weeks periodization cycle, Overload and underload combined with small-sided games.

BES558 Current Approaches and Corrective Exercises in Fitness Applications 2+1 7.5

Self-Myofascial Release Applications; Posture Analysis; Proprioseptive Exercises; Resistance Training; Flexibility; Active Streching; Stabilization; Mobilization; Plymometrics; Functional Movement Screening; Corrective And Protective Exercises; Training Load; Velocity Based Training; Acute-Chronic Work Load Ratio; Drill Categorization; Internal Load; External Load; Rating Of Perceived Exertion; Total Quality Of Recovery; Injury Risk Monitorization; Strength Asymmetry.

BES559 Match and Player Analysis in Team Sports 3+0 7.5

Match Analysis Methods: Time-Motion Analysis; Real Time Data Tracking; Player Form; Card Chart; League Table Preparation; Team And Player Statistics Tracking; Defence And Offence Analysis; Spacing; Running Distance Analysis; Offence Strategies; Game System Analysis; Home-Away Analysis; Scouting; Playing Time; Clip Editing; Reporting; Display; Analysis Programmes; Communication and Feedback for Player.

BES561 Introduction to Exercise Neurophysiology 3+0 7.5

Basic concepts on central nervous system: Neuroanatomy, Action potential, The evaluation of excitability and innervation terms; Macroscopic anatomy of central nervous system: Brain membrane and vein sinus anatomy, The ventricles of brain, The circulation of cerebrospinal fluid, The gross anatomy of central nervous system; The basic structure and functions of central nervous system: The basic structure and functions of truncus cerebri (medulla oblongata, pons, mesencephalon), The basic structure and functions of diencephalon (thalamus, hypothalamus, hypophysis, epithalamus), The basic structure and functions of formatio reticularis and cerebellum.

BES562 Evaluation of Physical Fitness in lndividuals with Special Needs 3+0 7.5

Physical Fitness: Basic terms; Relationship of Physical Activity and Physical Fitness; Physical Activity and Health: Health assessment, Classifications; Health Related Physical Fitness; Performances Related Physical Fitness; Physical Activity in Individuals with Special Needs; Physical Fitness in Individuals with Special Needs; Evaluation of Physical Fitness in Children and Children with Special Needs.

BES563 Health and Exercise 3+0 7.5

Growth and development; Health and Hygiene Education; Physical Fitness, Health and Wellness: Health and well-being, Health benefits of physical activity; Health Assessment: Measurement tools used for assessment, Physical control and medical report; Effects of Exercise on Health; Cardiovascular System; Hormonal System; Energy Systems; Sports and Exercise in Children and Young People; Exercise Prescription for Sports and Exercise, Health and Physical Fitness in the Elderly.

BES564 Adapted Physical Education and Sport 3+0 7.5

History of disability sports, General rules of Paralympics games, Paralympics sport foundations, Definition of disability person and classification, Effect of exercise education in Disability persons, Physical adaptation programs for disability persons, Dance activities for disability persons, Adapted sport activities for different disability persons, Sport accident and rehabilitation for disability athletes, Doping for disability athletes, Specific Olympic.

BES565 Electrophysiological Training Methods in Sports 2+1 7.5

Basic concepts of electricity and current terminology related to human physiology, The use of sportive performance of electrophysiology, Electrical muscle stimulation techniques and applications, Basic mechanisms of electrical muscle stimulation: Chemical mechanism: Action potential, Intensity-duration curve of electrical currents, Physiological mechanism, Neural mechanism, Electrical muscle stimulation parameters and regulations: Amplitude, Amplitude increase and decrease time, Frequency, Pulse duration, Work time, Electrodes.

BES566 Practical Application to the Study of VO2 Kinetics 2+1 7.5

Mechanistic Bases of VO2 kinetics: Model Characterization of VO2 kinetics, Mean Response Time, Oxygen Consumption During Resting, Time Constant of Oxygen Consumption, Explanation via Exponentiel Function of Slow Component of Oxygen Consumption, Data Modeling; Test Protocols of Constant Sub-sthreshold, Test Protocols of Constant Supra-threshold, Effects of Training with Different Intensities on VO2 Kinetics.

BES567 Oxygen Uptake Kinetics 2+1 7.5

Aerobic Energy Metabolism: Maximal Oxygen Consumption, Exercise Economy, Running Economy, Oxygen Debt; Oxygen Uptake Kinetics, VO2, VO2 Kinetics Concept; Constant Load Exercises: Sub-Threshold Exercises, Supra-threshold exercises, Phases of VO2 Kinetics: First Phase (Cardiodynamic Phase), Phase II (Basic Phase), Phase III (Steady State Phase), Slow component of VO2, Physiological Basis of Oxygen Transport and Use.

BES568 New Approaches and Models in Physical Education and Sports 3+0 7.5

Physical Education Curriculum and Constructivism: Constructivist approach, Constructivist game teaching, Tactical Game Approach Teaching: TOYA model components, TOYA teaching and learning at elementary level, Individual and Social Responsibility Model: Individual and social responsibility teaching themes, Strategies, Sports Education Model: Basic features of SEM, Issues to be considered in SEM curriculum, Classroom management and behavior development, Field Applications of Models.

BES569 Acute and Chronic Adaptation to Exercise at High Altitude 2+1 7.5

Physiological Effects of High Altitude: Acute Effects of Altitude on Maximal Oxygen Consumption, Hearth Rate, Stroke Volume, Cardiac Output, Acute Effects of Altitude on Exercise Economy, Running Economy and Oxygen Debt; General Altitude Training Concepts; Live High Train Low, Live High Train High, Live Low Train High, Intermittent Hypoxia Training, Physiological Responses to Normobaric Normoxy and Normobaric Hypoxia.

BES570 Academic Writing in Social Sciences: Movement Education, Physical Activity and Sedentary Behaviour 3+0 7.5

Academic Writing as a Text; Field Specific Writing; Ethics of Academic Writing; IMRAD Technique: Introduction, Methods, Results, Discussion; Introduction Writing in Movement Education; Method Writing in Movement Education; Presentation of Results in Movement Education; Discussion of Findings in Movement Education; Tables and Graphs for Qualitative and Quantitative Data; Reference Writing Styles; Software for References: Mendeley, EndNote; Quality Journal Selection Process; Communication with the Editor and the Referee; The Importance of Learning the Referee Process as a Researcher.

BES571 Model Based Physical Education Teaching 3+0 7.5

Basic Concepts in Physical Education Teaching: Definition and importance of physical education, Definition and elements of curriculum, Instruction models, Direct teaching model: Theoretical foundations of direct teaching model, Direct teaching model features and applications, Individualized teaching model: Theoretical foundations of individualized teaching model, Individualized teaching model properties and applications, Cooperative Teaching Model: Theoretical foundations of cooperative teaching model, Cooperative teaching model features and applications, Peer Teaching Model: Peer teaching model theoretical foundations, Peer teaching model properties and applications, Field Applications of Models. 706

BES572 Sedentary Behaviour Epidemiology 3+0 7.5

Introduction to Sedentary Behaviour; Measurement of Sedentary Behaviour; The Descriptive Epidemiology of Sedentary Behaviour; Physiological Responses to Sedentary Behaviour; Sedentary Behaviour and Adiposity; Sedentary Behaviour, Diabetes, and the Metabolic Syndrome; Sedentary Behaviour and Cancer; Sedentary Behaviour and Depression; Sedentary Behaviour and Ageing; Sedentary Behaviour and Mortality; Models for Understanding Sedentary Behaviour; Understanding Sedentary Behaviour in Individual Level; Sedentary Behaviour Among Overweight and Obese People; Sedentary Behaviour and the Social and Physical Environment.

BES573 Psychology for Physical Education and Sport 3+0 7.5

Establishing a Positive Motivational Climate in Physical Education; Goal Setting in Physical Education; Measuring Perceived Motivational Climate in Physical Education; Experience of State Anxiety in Physical Education; Social and Emotional Learning in Physical Education; Facilitating Prosocial Behavior Physical Education; Group Development in the Physical Education Class; Promotion of Healthy Self-Concept; Self-Regulation and Strategic Learning; Promoting Motor Learning in Young Children; Promoting Motor Skills in School Children and Adolescents; Visuomotor Control of Movement Acquisition; Core-Based Motor Teaching.

BES574 Human at Extreme 3+0 7.5

Extreme Environments; Physiological Effects of Hypobaric Environment; Atmosphere and Hypoxia; Barotrauma; Effects of Hypobaric Environment on Health; Exercise at High Altitude; Self Imposed Stress; Physiological Effects of Acceleration; Physiological Effects of Motion; Spatial Disorientation; Motion Sickness; Physiological Effects of Vibration and Noise; Physiological Effects of Thermal Stress; Physiological Effects of Hyperbaric Environment; Underwater Exercise; Space Physiology; Exercise in Space.

BES575 Basic Strategies and Design in the Preparation of Physical Education Programs 3+0 7.5

Physical Education Program Design; Education and Instructional Design in Physical Education; Macro and Micro Level Education Design; Physical Education Program Dimensions and Design; Creating The Program Design Team And Deciding Program Design Approaches For The Draft Program To Be Prepared; Preparing A Physical Education Program Design: Determining the need for education, Arrangement of objectives, Selection and arrangement of content, Pilot implementation and development of Physical Education programs, Continuous evaluation of the instructional program put into effect.

BES576 Sport and Ergonomics 3+0 7.5

Ergonomics and Classification of Ergonomics; Anthropometry; Introduction to Biomechanics; Human and Performance; Physical Activity and Energy Requirements, Fatigue and Determination of Breaks; Lifting, Carrying, Force Applications in Sports Activities; Stress; Agedness and Performance; Monotony; Ergonomic Analysis of Sports Activities; Accidents and Statistics in Sports Activities.

BES577 Theoretical Foundations of Program Development in Physical Education 3+0 7.5

Basic Concepts of Education; Education, Teaching, Teaching, Learning, Culture, Acculturation; Theoretical Foundations of Program Development: Historical and social foundations, Philosophical foundations, Psychological foundations; Elements of the Educational Program: Target, Content, Teaching-Learning process, Evaluation; Features of the Educational Program Physical education program review; Program Development Models; Taylor model, Taba model, Taba-Tylor model, MEB model; Physical Education Curriculum Development Studies in Turkey.

BES578 Upper and Lower Extremity Sports Injuries 3+0 7.5

Clinical Approach to Shoulder Pain; Rotator Cuff İnjuries and Shoulder İnstability; Biceps Pathologies, Slap Lesions and Lack of Glenohumeral İnternal Rotation; Other Causes of Shoulder Pain; Forearm and Upper Arm Pain; Acute Elbow İnjuries; Approach to Hand and Finger İnjuries, Fractures and Joint Dislocations; Approach to Hip Pain; Approach to Groin Pain; Acute Knee İnjuries; Anterior Knee Pain; Approach to Leg Pain; Acute Ankle İnjuries; Foot Pain.

BES579 Physical Activity and Population Health 3+0 7.5

Meaning of Education in Physical Education: Sports education; Approaches to Health and Well-Being: Biological approach, Behavioral approach; Theory, Model and Approaches for Physical Education and Well-Being: Planned behavior theory; Physically Trained Student and Health Literacy: A Global Political Developmental View; Physical Activity as a Preventive Therapy; Physical Education Models for Health Promotion; Physical Dimension of Health and Physical Education; Spiritual Dimension of Health and Physical Education; Cognitive Dimension of Health and Physical Education; Contemporary Issues: Investigating the Power of Educational Approaches in Health.

BES581 Scientific Aproaches In Movement and Sport Education 1+2 7.5

What is Movement and Sports Education Research ?; Teacher as a Researcher: Physical Education Teacher, Academician; School as a Research Environment: University, Secondary School, High School; Research Needs in Schools; Research Process in Movement and Sports Education; Question, Aim and Hypothesis in Movement and Sports Education; Movement and Sports Education Literature; Theory Based Research in Movement and Sports Education; Research Methods in Movement and Sports Education; Data Collection Procedure and Process in Schools; Data Collection Ways in Schools: Quantitative Approaches; Data Collection Ways in Schools: Qualitative Approaches; Evaluation of Collected Dat.

BES583 Social Determinants of Physical Activity 3+0 7.5

Socio-economic Level; Revenue; Social Health System; Social Support; Social Exclusion; Immigrants; Social Solidarity; Social Norms; Social Behavior; Discrimination; Social Stress; Education; Age; School Structure; The Living Environment; Parks; Traffic; Public Transport System; Working Hours; Workers; Blue Collar; Social Variables and Psychology; Physical Activity in Preschool Education.

BES592 Seminar 3+0 7.5

BES601 Teaching Methodology in Physical Education and Sports 3+0 7.5

Education and Teaching; Learning and Teaching; Basic Concepts about General and Special Teaching Methods; Principles, Aims, Content, Learning and Teaching Processes of Physical Education and Sports Teaching; Planning and Performing Physical Education and Sports Activities; Writing Overall and Behavioural Objectives; Organızation of Content; Teaching Strategies, Methods and Techniques in Physical Education and Sports; Selection and Evaluation of Course Materials in Physical Education and Sports Teaching; Assessment of Students Success in Physical Education and Sports Teaching; Micro-Teaching Practices and Evaluation.

BES607 Sports for the Disabled 3+0 7.5

Program Organization and Management in Adapted Physical Education and Sports; Individualized Education Programs; Testing and Evaluation; Sports Organizations; Instructional Strategies for Adapted Physical Education; Disabled People: Mental retardation, Learning difficulties and attention deficiency, Behavioural disorders, Visual impairment and Deafness, Cerebral palsy, Traumatic brain injury, Amputations, Spinal cord disabilities; Developmental Considerations; Activities for the Disabled: Physical fitness, Rhythm and dance, Aquatics, Team sports, Winter sports activities; Enhancing Wheelchair Sports Performance.

BES612 Neuromuscular Adaptation and Fatigue 3+0 7.5

Introduction to Nervous System; Introduction to Muscle Physiology; Skeletal-Muscle Mechanisms; Muscle Physiology of Strength, Speed, Power and Endurance Performance; Definitions of Strength, Speed, Power and Endurance; Differences Among Muscular Strength, Endurance, and Power; Neural Activation in Strength, Speed and Power Performance; Motor Units; The Effect of Contraction Type on Motor Unit Activation;The Effect of Contraction Speed on Motor Unit Activation; Neuromuscular Adaptation in Physical Work; Definition of Fatigue; Causes of Fatigue; Fatigue in Strength, Speed and Power Performance; Recovery.

BES616 Medical Subjects in Sports and Health Organizations for Athletes 3+0 7.5

Health Care System for Athetes: Roles, Relationships and Organizations; Epidemiology of Sports Injuries; Injury Prevention: Environmental factors, Equipment, Condition; Evaluation and Rehabilitation in Sports Injury; Special Considerations: Diabetic athletes, Blood pressure disorders, Sudden death; Participation into Exercises in Different Groups: Risks and Benefits of Exercise; Contraindications; Pre-Exercise Evaluation Methods and Exercise Prescriptions; Pharmacology and Drug Taking; Child and Adolescent Athletes; General Health Condition and Environmental Injuries.

BES619 Training Theory I 3+0 7.5

The Concept of Training; Loading and Recovery; The Structure of Efficiency; The Concept of Performance: Performance Follow-Up, Evaluation of Performance, Factors Affecting Performance; Basic and Secondary Principles of Training; The Relationship between Loading and Resting; Recovery and Planning; Periodization; Structure of Microcyle; Structure of Mesocyle; Structure of Macrocyle; Single- and Multi-Periodization; Children and Training; Stages of Development and

Training; Biomotor Characteristics and Training; Talent Selection and Talent Orientation; Antropometry; Endurance Development; Physiology of Endurance; Maximal Oxygen Consumption; Anaerobic Threshold; Running Economy; Training Methods in Endurance Development .

BES620 Training Theory II 3+0 7.5

Strength Development: Physicomechanical bases of strength, Various types of strength, Measurement of Strength, Periodization of Strength, Strength in Various Sports; Speed Development; Physicomechanical Structure of Speed, Factors affecting Speed, Speed training exercises, Speed tests, Anaerobic strangth and capacity; Flexibility Development: Flexibility and its physicomechanical characteristics, Various types of flexibility, Flexibility training; Training and Children; Training and Stages of Development; Biomotor Characteristics and Training; Talent Selection and Talent Orientation; Antropometry, Training and Fatigue; Loading/Recovery/Fatigue; Control of Fatigue: Planning the training process; Control of Fatigue: Active/passive rest; Control of Fatigue: Nutrition and periodization; Form Training: Volume, intensity and frequency relations, Planning form training; Altitude Training and Periodization; Women Athletes and Trainig: Menstruation, repose and sleep.

BES626 Contemporary Approaches in Sport and Exercise Psychology 3+0 7.5

Contemporary Approaches in Sport and Exercise Psychology: Exercise Psychology: Definition, Emergence and Development; Sports Psychology: Definition, Emergence and Development; Differences in Exercise and Sport Psychology; Traditional and Contemporary Approaches To Exercise and Sport Psychology; Exercise and Sport Psychology Knowledge of How To Follow A Path That; What Suggestions As To What Cases Brought; Describes the Definition of Sports Psychologist.

BES627 Social Psychology of Sport 3+0 7.5

Social Psychology of Sport: Sociology, Psychology, Attitudes, Behavior, Social Effects, Social Cognition and Perception: Social Psychology and Social Psychology of Sport; Group Dynamics and Team Dynamics; Group Integrity; Social Loafing and Social Acceleration Theory Theory; Success in Sports and Target Research; Leadership, Groups and Group Communication in Leadership and Leadership Models and Their Properties.

BES628 Arousal Theories in Sport 3+0 7.5

Arousal Theories in Sport: Arousal Concepts and Definitions; Arousal in Sports Media; Stress and Coping in Sport; Anxiety in Sport: Anxiety Theories and Measurements; Competition; Relationship Between Anxiety and Performance in Sport; Relationship Between Anxiety End Attention in Sport; Relationship Between Anxiety End Burnout in Sport; Anxiety Control; Fear And Anxiety in Top-Level Athletes Training Arrangements.

BES629 Research Methods and Techniques in Sports 3+0 7.5

Research Methods and Techniques in Sports: Sports Scientific Research Process Stages; Research Problem, Purpose and Sub-Objectives, Importance and Assumptions Literature To Be Aware of Specifications, The Research Model, The Universe and Sample, Data Collection Methods and Research Data Gathered in The Sports Field Is A Problem Scientific Research, According To The Methods and Techniques To Solve Advanced Proficiency.

BES630 Exercise Approaches for Special Groups 3+0 7.5

Exercise Approaches for Specific Groups: Exercise Management; Exercise As A Treatment; Children and Teenagers Exercise; Women in the Exercise; Exercise in the Elderly; Metabolic Syndrome and Exercise; Obesity and Exercise; Anemia and Exercise; Asthma and Exercise; Diabetes and Exercise; Hypertension and Exercise; Fibromyalgia and Exercise; Hyperlipidemia and Exercise; Chronic Fatigue Syndrome and Exercise.

BES631 Instructional Models for Physical Education 3+0 7.5

Basic Concepts About Teaching and the Relationship Between Learning and Teaching; Main Features of Teaching Models; Direct Instruction; Personalized System for Instruction (PSI); Cooperative Learning; Sports Education; Peer Teaching; Inquiry Teaching; Tactical Games; Teaching for Personal and Social Responsibility; Comparison of the Instructional Models.

BES632 In Biological Systems Methods of Analysis of Reactive Oxygen Species 3+0 7.5

In Biological Systems Methods of Analysis of Reactive Oxygen Species: Reactive Oxygen Species and Free Radicals Resources; The Effects of Free Radicals; Quantitative Analysis of Reactive Oxygen Species in Biological Systems, Methods; Analysis of Markers of Lipid Peroxidation; Analysis of Protein Oxidation Reagent; Analysis of DNA Damage Markers; Antioxidant Enzyme Analysis; Pro-Oxidant Effect of the Antioxidant Added.

BES633 Exercise Prescription 3+0 7.5

Exercise Prescription: Activity Models of Guidance and Risk Levels; Exercise and Quality of Life; Exercise Tests and General Principles; Assessment and Exercise Prescription Principles; VO2 Based Exercise Prescription; By Cardiorespiratory Fitness Exercise Prescription; Exercise Prescription Based on Perceived Exertion; According To the Load

of Exercise Prescription; Prescribing Exercise To Lose Weight; By Cardiovascular Endurance Exercise Prescription; Exercise Prescription for Muscle Strength; Exercise Prescription for Flexibility and Balance; Individual Evaluation and Testing.

BES635 Anti-Aging and Exercise 3+0 7.5

Anti-Aging and Exercise: Age Period and the Classification of the Aging Process; Theories Related To the Aging Process; Aging Physiology; Aging in the Process of Cardiopulmonary, Skeletal Muscle and Nervous System Changes: Old Age and the Effects of Exercise; Old Age, Illness And Exercise; In Old Age the Basic Principles of Exercise and Exercise Prescription; Cardiovascular Exercise Programs for Older Individuals; Aged for Muscle Strength Exercise Programs for Individuals; For Elderly Individuals for Flexibility and Balance Exercise Programs; Old Age, Risk Factors and Mesasures of Exercise in the Process Are Explained.

BES636 Pedobarographic Applications During Various Motor Tasks 2+1 7.5

Anatomy of the Foot and Ankle; Structure and Function of the Foot; Technology for Recording Kinetic Variables: Position transducer, Accelerometers, Force plates, Pressure insoles; Foot Plantar Pressure Measurement Systems: Platform systems, In-Shoe systems; Requirements for Foot Plantar Pressure Measurement: Target implementation requirements; Recent Trends in Foot Plantar Pressure Measurement: Wired system application, General wireless systems application.

BES637 Exercise and Oxidative Stress 3+0 7.5

Exercise and Oxidative Stress: Reactive Oxygen Species and Free Radical Concept; Antioxidant Defense System; Oxidative Stress; Mechanism of Free Radical Production During Aerobic and Anaerobic Exercise; Reactive Oxygen Species and Skeletal Muscle Function; Fatigue Mechanism and Delayed Muscle Pain Syndrome; Antioxidant Defense System in Response To Acute and Chronic Exercise; Exercise, Oxidative Stress and Antioxidant Supplementary.

BES638 Sportive Technical Analysis Applications 2+1 7.5

Kinetic and Kinematic Analysis Methods: Angle, Velocity, Acceleration, Angular and linear velocity, Joint moment and power; Organizing Three Dimensional Analyzing Environment: Camera placement, Marker placement, Volume calibration, Collecting and analyzing data; The Use of Surface Electromyography: Skin preparation, Normalization techniques, Collecting data and analyzing data.

BES646 Global Positioning System (GPS) and Sport Specific Testing 1+2 7.5

Basic Principles of Global Positioning Systems; Metabolic Power; Indoor and Outdoor Tests; Data Collection; Data Processing; Reporting; Theoretical and Practical Applications; Training Record; Physical Demand; Low Moderate High Intensity Activity; Injury Risk Index; Real Time Player Tracking; Applications of Different Sport Branches; Location; Acceleration Deceleration; Change of Direction; Hotspot Plots; Jump; Player Load; Collisions; Repeat High Intensity Efforts.

BES648 Assessment of Reaction Analyses with Neuro-Physiological and Physiological Variables 2+1 7.5

Stress and Stages: Internal and external stress sources; Stress and its effects: Physiological effects of stress, Psychomotor (behavioral) effects of stress; Measurement of stress, Measurement of stress through neural changes and eye-movement changes, Advantages of EEG, Signal of EEG, Brain waves, Excitation potentials (UP), EEG and stress evaluations; Eye Movement Behavior: Gazing, Saccadic eye movements, Smooth pursuit eye movements,:Eye tracking and sports performance.

BES649 Performance Monitoring in Sport 2+1 7.5

Basic Concept of Athlete Monitoring: Body Stress, Fatigue, Biochemical markers; Current Technologies in Monitoring Athlete: GPS technology, Heart rate telemetries, Questionaries' based on computer technology; Measures of Fitness and Fatigue; Monitoring Different Conditioning Features; Athlete Monitoring and Evaluation Guidelines for Individual Sports; Athlete Monitoring and Evaluation Guidelines for Team Sports.

BES651 Training Load Monitorization and Field Test in Team Sports 1+2 7.5

Time Motion Analysis Via Global Positioning Systems: Sprint analysis (number and duration), Running speed analysis (max, min, avr), Physical activity record, Total running, Distance, Total running time, Load percents, Exertion points, Speed calculations; Training units calculations: F.I.T.T. principle, Metabolic power; Field Tests: Indoor and outdoor tests, Data collection, Data processing, Reporting, Theorical and practical applications, Training record, Physical demand, Low-Moderate-High intensity activity, Injury risk index, Different pitch size trainings, Real-time player tracking, Applications of different sport branches, Location, Force, Angle, Direction, Dista

BES652 Physical Fitness in lndividuals with Special Needs 3+0 7.5

Evaluation and Prescribing Principles: Physical fitness tests, Program design, Exercise program preparation; Cardiorespiratory Physical Fitness Measurements: Terms, Maximal and submaximal measurements; Preparing Cardio-

respiratory Exercise Program; Muscular Physical Fitness Measurements: Terms, Muscular strength and endurance measurements, Muscular measurements in children and adults; Preparing Muscular Exercise Program; Evaluation of Body Composition; Weight and Body Composition Management; Flexibility Measurements; Flexibility Exercise Program Planning.

BES654 Fundamentals of Electroencephalography (EEG) and Signal Processing Methods 2+1 7.5

Bioelectrical Events, Sources of Biopotentials, Central Nervous System Functions and Electrical Activity, Electroencephalography (EEG), EEG Rhythms, Instrumentation, Methods of Evaluating EEG waves, Application of Biomedical Signal Processing Methods, Evoked Potentials, Application Areas and Value of EEG, Quantified EEG, Electrical Brain Activity Map, Biofeedback and EEG.

BES655 Use of Eye Tracking Technology in Different Sports Branches 3+0 7.5

Anatomy and Physiology of the Oculo-Motor System: The structure of eye, The function of eye structure, The muscles of eye, The nerves of eye; Brain and Vision; The Eye Tracking System: What is eye tracking and how does it work?, The history of eye tracking researches; Eye Movements: Saccadic eye movements, Neurophysiology of saccadic eye movements, Fixations, Neurophysiology of visual fixation, The theoretical infrastructure of the quite eye and the quite eye, The quite eye in cognitive psychology / neuroscience; Eye Tracking Research in Different Sports Branches; An Evaluation of Eye Tracking in Computer Games and e-Game; The Eye-tracking in Sports Skills Training and Performance Analysis.700

BES657 Physical Education and Sports far lndividuals with Special Needs 3+0 7.5

Motor Development and Learning: Concepts, Motor development theories, Motor learning; Evaluation of Physical Fitness and Motor Development; Body Awareness and Posture; Physical Education and Adaptation: Adapted physical education, activities and sports, Aquatic activities; Teaching Approaches in Physical Education: Basic learning principles; Methods of Reducing Problem Behaviors; Individualized Physical Education Program; Physical Education and Sports for Individuals with Special Needs.

BES661 Motivational Orientations in Sport 3+0 7.5

Basic Concepts Related to Physical Activities; Basic Concepts About Motivation; Relationship between Physical Activity and Motivation; Development Steps of Motivation; Developmental Stages of Motivation in Children; Success Surveys in Sport; Target Investigations in Sport; Intrinsic Motivation; External Motivation; Intrinsic and External Motivation in Exercise and Sport; Target Identification in Sport and Physical Activities; Self-efficacy as a determiner of exercise.

BES663 Program Development Models in Physical Education 3+0 7.5

Education, Philosophy and Educational Philosophy; Program Phenomenon in Physical Education and Scope of Program Development Concept; Program Development Theories in Physical Education; Program Development Models: Taylor model, Taba model, Oliva model, Schawab model; Mixed Models and Other Program Models in Physical Education; New Program Development Models in Physical Education.

BES692 Seminar 3+0 7.5

BES790 Thesis 0+1 30.0

BES890 Thesis 0+1 30.0

BES890-0 Thesis (Thesis Proposal) 0+1 30.0

BİL503 Object Oriented Programming 3+0 7.5

Comparison Between Traditional Programming Language And Object Oriented Programming Languages; Properties of Object Oriented Programming; Encapsulation; Data Hiding; Inheritance; Polymorphism; Programming With C++ and JAVA; Function Overloading; Inline Functions; Data Abstraction; Classes; Abstract Classes; Methods; Constructor; Destructor; Static Functions; Public; Private and Protected Functions; Pointers; References; Operator Overloading; Exception Handling; Visual Programming.

BİL504 Data Structure and Algorithms 3+0 7.5

Definition of Data; Linear Lists; Arrays; Stack; Queue; Linked Lists; Memory Allocation and Arrangement; Many Conjunction Lists; Tree Structures; Operation on the System; Search Methods; Sorting Methods; Merging Methods; Register and Minutes Concepts; Physical Register Arrangement; Addressing Methods; Indexed Arrangement in Ordered Register Regularity; Distributed Addressing; Pointers; Chain and Ring Structures.

BİL505 Data Systems: Analysis and Design 3+0 7.5

System Concept; System Analysis Principles; Organization And Management As A System; Management and Data; Data Production Process; Development of Data Systems; Data Management Systems; Decisions Support Systems; Analysis; Design; Application.

BİL506 Database Management Systems 3+0 7.5

Database Concept; Database Models; Relational Database Model; Hierarchical Database Model, Network Model; Logical Design of Databases; Physical Design of Relational Database Model; Integration of Relational Databases and SQL/DS; Distributed Databases; Object Oriented Database Management Systems; Expert Database Systems; Uncertainty In Database Systems; Office Data Systems; Application With ORACLE PL/SQL.

BİL507 Introduction to Operating Systems 3+0 7.5

Fundamental Concepts of Operating Systems; Services Provided By Operating Systems; Resource Management; Job Management; Job Scheduling; Time Sharing; Multitasking; Memory Management; Process Management; Virtual Memory; Paging; Interrupt Structures and Interrupt Processing; Arithmetic Processing Unit Management; Input/Output Inferior System; Register Management Inferior System; UNIX O/S Features and Internal Structure.

BİL509 Simulation and Modeling 3+0 7.5

Fundamental Concepts of Probability and Statistics; Discrete Simulation; Selecting Input Probability Distribution; Analog Computer Simulation; Generating Rational Number; Output Data Analysis; Statistical Methods For Comparing Alternative Systems; Simulation Languages and GPPS.

BİL510 Artifical Intelligence 3+0 7.5

Concept of Artificial Intelligence; Turing Test; Introduction to the Studies About Artificial Intelligence; Problem Solution And Searching Strategies; State-Space Approach; Problem Reduction Approach; Problem Representation; Search Techniques; Breadth-First Search; Depth-First Search; Iterative Deepening; Game-Playing; Knowledge Representation and Reasoning; Expert Systems and Rule Chaining; Vision; Natural Language Processing; Machine Learning; Artificial Neural Networks; Supervised Learning; Unsupervised Learning; Back propagation.

BİL511 Computer Aided Design 3+0 7.5

Using Computer For Design; Existing Computer Software to Be Used For Design; Designing Methods Using Autocad; Sample Designs.

BİL513 Numerical Analysis 3+0 7.5

Arithmetic Operations In Computers; Calculators; Errors And Algorithms; Finding Mid-Value Methods; Interpolation Methods; Lagrange; Hermite; Least Squares; Spline, Linear; Finite Distinctions; Numerical Derivation and Integration; Rounding Errors and Accelerating Convergence; Linear Equation Systems; Differential Equations; Runge-Kutta and Multi-Step Improvement Algorithms.

BİL514 Decision Support Systems 3+0 7.5

Decision Process and Knowledge in Managerial Decisions; Decision Making Process and System Approach; Critical Success Factors; Human's Intelligent Properties and Decision Forms; Management Process and Knowledge Support At Managerial Decisions; Models and Modeling Process; Using Models At Managerial Decisions; Static and Dynamic Models; Definiteness; Indefiniteness and Risk Environments; Mathematical Programming and Optimization; Simulation and Procedural Approaches; Decisions Support Systems (DSS) Structure and Properties; DSS Elements, Properties And Abilities of DSS; DSS Components; Setting Up Decision Support Systems; DSS Development Process; Users; Participants; Options of KDS Setup and Team Working; Decision Support System Tools; Database Systems; Dialog; Model and Database Inferior Systems; Programming Languages and Calculation Table Software; DSS Generators; Top Manager Data Systems; Expert Systems; Introduction to Artificial Intelligence; Sample Events.

BİL517 Logic Design 3+0 7.5

Logic Gates; Logic Variables; Number Systems; Data Representation; Computer Organization; Boolean Algebra; Logic Functions; State Tables; State Minimization; State Assignment; Karnaugh Maps; Instruction Formats and Addressing; Data Circuits (Coders, Multipliers); Flip-Flops; Clock-Mode; Sequential Circuits; Counters; Shift Registers.

BİL518 Microprocessors 3+0 7.5

Introduction to Eight Bit Microcontrollers; Motorola 68 HC11; Instructions and Machine Language; Addressing Modes; Advanced Programming; Indexing, Stacks; Procedures; Bit-Byte Processing; System Design With Microcontrollers; Memory Code Solution; Bus; Input/Output Units; Interrupts; Parallel Input/Output; A/D and D/A Processes; Serial Communication; Interrupt Systems; Real-Time Clock Program Timing; Working With COP Timing.

BİL519 Advanced Algorithm Analysis 3+0 7.5

Algorithm Analysis Techniques; Asymptotic Notation; Recursive Algorithms Design and Analysis; Randomized Algorithm Techniques; Greedy Algorithms; Dynamic Programming Techniques; Introduction to Graph Algorithms; Breath-First Search; Depth-First Search; Minimum Spanning Tree Algorithms; Shortest Path Algorithms; NP-Completeness and Undecidability; Approximation Algorithms.

BİL520 Advanced Communication Technology 3+0 7.5

Fundamental Concepts; Digital Technology; Sound and Image Compressing Methods; Data Communication Technology; Data Broadcasting Systems; Communication Satellites; Satellite Technology; Satellite Services; Use of Satellites; Advanced Television Systems; Digital Television; Advanced Radio Systems; Digital Radio; Computer Applications in Communication Technologies; Teleconference Systems; Multimedia Technologies.

BİL521 Management Information Systems 3+0 7.5

Information Technologies and Organizations; Developments in Computer Technologies; Roles of Information in Organizations; Strategic Effects of Development in Information Technologies; Internet and Organizations; Intranet; Electronic Management Environment; System Approach; System Concept; System Analysis; System Design; Database Management Systems; Management Information Systems; Concepts; Principles; Design; Application; Control and Improvement; Information Technologies Management; Trends in Information Systems.

BİL522 Computer Organization 3+0 7.5

Computer Hardware and Fundamental Structure of Software; Addressing Methods and Sequential Regularity of Machine Program; Processing Unit; Input-Output Organization; Memory; Arithmetical Operations; Pipelining; CISC, RISC and Heap Processor Samples; Computer Environment Units; Large Computer Systems.

BİL523 Computer Networks 3+0 7.5

OSI Reference Model and Fundamentals of Layered Network; TCP/IP Reference Model; Physical Layer; Data Communication; Transmission Media; Wireless Transmission; Communication Satellites; Data Link Layer; Error Detection and Error Correction; Stop-And-Wait Protocol; Sliding Window Protocol; Medium Access Sub layer; ALOHA; CSMA; Ethernet Protocol; Bridges; LAN; Network Layer; Routing Algorithms; Congestion Control Algorithms; IP Protocol.

BİL525 Fast Application Development 3+0 7.5

Using Traditional Programming Languages in Software Development; Easiness Provided By Object-Oriented Programming Languages; Visual Programming; Integrated Development Environments and Their Advantages; Team-Working; Application Development Using Visual Basic or Delphi: Visual Programming Objects; Components; File Access; Database Operations; Using SQL.

BİL527 Computer Programming I 3+0 7.5

Computer Basics: Software, Hardware, Operating Systems; Number Systems: Decimal, Binary, Octal, Hexadecimal; Algorithms; Flowcharts; Program Coding, Programming with Java: Primitive Data Types and Operations, Selection Statements, Looping Constructs, Reading from Keyboard, Printing to Screen; Methods; Arrays.

BİL528 Computer Programming II 3+0 7.5

Objects and Classes; Strings and Text I/O; Object Oriented Programming Concepts : Inheritance, Encapsulation, Polymorphism; Abstract Classes and Interfaces; Inner Classes; GUI Basics and Event Driven Programming; Exception Handling.

BİL532 Computer Vision 3+0 7.5

Introduction and fundamentals; Image sampling; Image filtering; Edge detection; Corner detection; Feature detection; Feature invariance; Feature descriptors; Feature matching; Image transformations; Camera and perspective transformations; Stereo; Introduction to object detection; Image classification; Convolutional neural networks; Deep learning and computer vision applications.

BİL533 Data Science 3+0 7.5

Python Programming: Building blocks, Data structures, Object oriented programming; Project Life Cycle in Data Science: Data collection and processing, Feature engineering, Modelling; Data Visualization; Clustering; Predictive Analytics: Principal component analysis, Multiple linear regression, Classification; Big Data Analysis; Business Intelligence and Data Warehousing; Storytelling in Data Science; Data Science Applications.

BİL534 Digital Image Processing 3+0 7.5

Digital Image Acquisition: Image sensing, Image sampling and quantization; Image Enhancement in the Spatial and Frequency Domain: Gray level transformations, Histogram processing, Filters for smoothing and sharpening; Color Image Processing; Morphological Image Processing; Image Segmentation; Image Compression; Image Recognition and Classification; Image Processing Applications: Smart transportation, Medical image analysis.

BİL535 Artificial Intelligence in Healthcare 3+0 7.5

Digital Transformation in Healtchare; Medical Data Analysis; Computational Model Development in Healtcare Problems and Tools: Tensorflow, Keras, Pytorch, Anaconda, NumPy, ScikitLearn, OpenCV; Computational Model Development Stages; Clinical problem definition, Data curation, Data annotation, Model development, Model evaluation; Deep Learning Techniques in Medical Data Analysis; Medical Data: Imaging data, Text data, Reports, Demographcis, Data privacy; Medical Data Analysis Applications: Medical image segmentation, Clinical object detection and tracking, Lesion detection and classification, Prognosis.

BİL551 Advanced Database Management Systems 3+0 7.5

Relational Database Theory; Data Models and Query Languages; Object-Relation Model; Functional Data Models; Semantic Data Models; Object Oriented Databases; Next Generation Databases; Realization Techniques; Access Way Selection, Query Improvements; Locks; Parallelism Control; Process Data Concept; Pillow Management; Distributed Database Systems; User Interfaces.

BİL552 Programming Languages 3+0 7.5

Syntax; Semantics; Data Concept; Flow Control Structures; Methods and Parameters; Block Structure and Activities Depending on the Static or the Dynamic Structure of the Program; Defining New Data Types; Dynamic Data Types; Functions and Recursion; Modules; Modular Program Structures; Using Modules; Separate Compilation; Parallel Tasks.

BİL553 Object Oriented Systems 3+0 7.5

Comparison Between Traditional Languages and Object Oriented Languages; Properties of Object Oriented Programming Languages; Encapsulation; Data Hiding; Inheritance; Polymorphism; Object Oriented Analysis and Design; Instances; Abstract Classes; Defining Class Structure; Member Variables, Methods; Object Oriented Software Engineering; Graphics Projection and Methodology With Object Oriented Software Development; Design for Reuse; Productivity and Related Subjects.

BİL554 Operating Systems 3+0 7.5

Main Concepts; Functions of Operating Systems; Single and Multiple Processing Systems; Tasking: Multitasking; Interactive Processes; Real-Time Processes; Interrupts; Interrupt Vector; Returning From Interrupt Handler; Interrupt Management; I/O Interfaces: I/O Programming Techniques; I/O Interface Programming; Selective and Interrupted Programming; Direct Memory Access; Memory Management: Single and Agglutinative Memory Management; Segmented Memory Management; Image Memory: Paging; Segmenting; Job Management; Task Management: Parallel Processing; Tasks Working Together; Response Exclusion; Time Harmonization With Semaphores, Communication Between Tasks; Deadlocks: Dealing With Deadlocks; Register Management; Guide Structures; UNIX.

BİL555 Advanced Computer Networks 3+0 7.5

Routing: Optimality Principle; Shortest Path Algorithm, Flooding; Distance Vector and Connection Statue Algorithms; Flow and Traffic Control: Approved and Threshold Flow Control; Traffic Shaping; Congestion Avoiding; Connecting Networks: Bridges; Routers; Tunneling; Routing In Internet: OSPF and BGF Protocols; Point to Point Connection: Connection Management and Flow Control; Multiplexing, TCP Protocol; Management: Management in OSI; ANSI Notation; CMIP Protocol; Management in Internet; SNMP Protocol; Network Security; Cryptography Principles; Public and Secret Key Methods; Decryption; Digital Signature.

BİL556 Computer Graphics 3+0 7.5

Fundamental Concepts; Use of Computer Graphics in Engineering; Principles of Graphics; Polygons; Transformations; Segment Concept; 2D And 3D Graphics; Windowing Concept; Representation of Surfaces; Hidden Lines and Surfaces; Color; Shading and Lighting Methods; Curves and Surfaces; Graphical Databases; Graphics Standards; Texture Mapping; Controlled Deformations; Simulation; Animation.

BİL557 Internet Software 3+0 7.5

Client/Server Mechanism; Programming Methods From Client Aspect; Application Development From Server Aspect: Basic Introduction to CGI, Perl and PHP; Introduction to XML; E-Commerce and XML; ASP: Using HTML in Web Pages; Response and Request Objects; Form Elements, Application Objects; Session Objects; Server Objects; Cookies; File Operations; Vb script; Java script; Database Connections; Search Techniques; Application Areas.

BİL558 Parallel Programming 3+0 7.5

Parallel Programming Concept; Application Areas; Problems About Parallel Algorithms: Synchronization; Communication; Critical Sections; Synchronization Mechanisms: Semaphores; Monitors; and Others; Verification Methods and Application Examples; Communication Principles Based on Message Transmission; Randez-Vous Structure; Parallel Programming Methods in Operating Systems; Parallel Programming Languages: CSP; OCCAM; ADA; and Others; Designing of Classic Parallel Programming Algorithms and Examining.

BİL559 Software Engineering 3+0 7.5

Computer-Based System Engineering; Project Management; Requirements Analysis; System Models; Software Prototyping; Software Design: Architectural Design; Object-Oriented Design; Function-Oriented Design; Real-Time Systems Design; User Interface Design; Multilanguage Software Design Principles; CASE; Management: Managing People; Teaming; Socio-Psychological Analysis; Software Cost Estimation; Program Productivity; Quality Management; Process Improvement.

BİL560 Data Access Systems 3+0 7.5

Increasing Scientific and Technical Information and Data Access Problem; Automation Data Access; Naming: Data Access (DA) Term, Information Science; Data Access System Concept: Main Concepts; Theoretical Bases; Elements; Approaches; Automation Text Processing: Automation Natural Language Analysis; Mechanic Dictionary; Automation Summarizing; Indexing Language and Embedded Systems: Definition and Structural Relations; Choosing Terms; Remembrance and Sensitiveness Devices; Synonymous Control; Word Forms Control; Classifying the Terms; United Terms and Idioms; Tasks and Roles; Term Measuring; Automation Classifying Approaches: Document-Defining Vectors; Measuring Similarity Among Documents; Heap Approaches.

BİL561 Fuzzy Neural Networks 3+0 7.5

An introduction to fuzzy logic, Operations on fuzzy sets, Fuzzy relations, Fuzzy implications Linguistic variables, The theory of approximate reasoning, Defuzzification methods, Inference mechanisms, The perceptron learning rule, The delta learning rule, Winner-take-all learning, Integration of fuzzy logic and neural networks, Fuzzy neurons, Hybrid neural nets, ANFIS, Gradient based training algorithms, Trainable neural nets for fuzzy IF-THEN rules, Fuzzy rule extraction from numerical data, Neuro-fuzzy classifiers, Applications of fuzzy neural systems

BİL562 Network Security 3+0 7.5

Introduction to Network Security; Problems; Terminology; Private Key Cryptography Techniques: DES, 3DES, AES, Public Key Cryptography Techniques: RSA, Diffie-Hellman, One-Way and Mutual Authentication Techniques; Message Integrity Techniques: MD-5, SHA-1, Digital Signatures; Network Security Standards: Secure-E-mail (PGP), S-MIME, SSL, TLS, IPSec.

BİL563 Fuzzy Logic 3+0 7.5

Fuzzy Sets and Basic Operations on Fuzzy Sets; Fuzzy Relation and Extension Principle; Linguistic Variables; Fuzzy Logic and Approximate Reasoning; Fuzzy Rule Base; Fuzzy Inference Engine; Fuzzifiers and Defuzzifiers; Fuzzy System Design for Function Approximation, Fuzzy Systems as Nonlinear Mappings; Design of Fuzzy Systems from Input-Output Data; Table Look-Up Scheme; Gradient Descent Training; Fuzzy Clustering.

BİL564 Data Acquisition and Mining 3+0 7.5

Data and knowledge representation, Data preprocessing, Data mining algorithms, Decision trees, Association rules, Clustering, Classification, Web mining, Text mining, Collaborative filtering, Privacy preserving data mining, Regression analysis

BİL565 Rough Sets Theory 3+0 7.5

Rough Sets; Information Systems; Discernibility Set Approach; Reductions and Process of Reduction Algebra; Decision Rules and Synthesis; Data Gathering and Digitalization; Discernibility Matrix and Functions; Decision Based Discernibility

Matrix; Decision Based Discernibility Functions; Reduction Algorithms; Reductions by Using ROSETTA and Evaluating of Decision; To Use Genetic Algorithms, Johnson, Holte 1 and RSES Extended Agorithms in Reduction Process.

BİL566 Pattern Analysis 3+0 7.5

Mathematical and Statistical Foreknowledge; Pattern Types; Feature, Feature Extraction; Feature Selection, Optimal and Sub-Optimal Feature Selection Methods, Univariate and Multivariate Feature Selection Approaches, Classification and Classifier Types; Analysis of Recognition Performance; Various Pattern Analysis, Feature Selection and Classification Applications.

BİL567 Introduction to Recommender Systems 3+0 7.5

Collaborative Recommendation: User- and item-based predictions, Ratings, Practical solutions; Content-Based Predictions: Content, Similarity-based retrieval; Knowledge-Based Predictions: Knowledge representation, Constraint- and case-based predictions; Hybrid Predictions: Hybridization opportunities, Monolithic and parallelized hybridization; Explanations in Recommender Systems: Explanations in constraint- and case-based predictions, Explanations in collaborative filtering; Evaluation: General evaluation, Popular evaluation, Evaluation data sets.

BİL569 Big Data Systems 3+0 7.5

Big Data Infrastructure: Apache hadoop, MapReduce, Analysis tools, Interactive analysis tools, Scalable machine learning; Collecting and Transferring Big Data: Transferring bulk data from databases, Collecting streaming data; Storing Big Data: Apache HDFS, NoSQL and google bigTable, Apache HBase; Simple Data Processing: MapReduce framework, Implementing MapReduce applications; Big Data Analysis: SQL, Apache pig, Apache hive; Interactive Big Data Analysis: Google dremel, Dremel and impala; Machine Learning on Big Data: Scalable machine learning, Apache mahout, Machine learning algorithms, Evaluating models.

BİL571 Advanced Neural Network Models 3+0 7.5

The Basic Perceptron and Linear Separability; Multilayer Perceptrons and the Backpropagation Algorithm; Optimization Methods: Gradient descent method, Conjugate gradient method; Least Squares; Weighted Least Squares; Radial Basis Function Networks; Wavelet Neural Networks; Fuzzy Neural Networks; Fuzzy Wavelet Neural Networks; Type-2 Fuzzy Neura Networks; Type-2 Fuzzy Wavelet Neural Networks.

BİL591 Seminar 3+0 7.5

BİL592 Seminar 3+0 7.5

BİL599 Term Project 3+0 0.0

BİL604 Information Technology Management 3+0 7.5

Information Technology Concept; ITM Resources: Manpower, Hardware, Software, Money and support systems, Management information systems, Computer networks; Internet, Intranet and Extranet Concepts; E-Society and Its Fundemental Properties; E-Goverment; E-Business: Intranet policies and strategies; Information Technologies and Applications; Database Management Systems: Concept, Analysis and Design; Decision Support Systems; Information Sharing Policies; Information Security Principles; Data Mining; Project Management: Concepts, Management software.

BİL605 Distributed Computing Methods 3+0 7.5

Distributed Computaional Structures; Implementations of Different Algorithms in Popular Distributed Architectures; Shared Memory, Distributed Memory İmplementations; Emphasis on Map and Reduce Algorithm As Made Popular by Its Recent Applications in Scientific Computing

BİL606 Natural Language Processing 3+0 7.5

General Introduction to Natural Language Processing Applications; Grammars and Parsing; Morphological Analysis; Semantic Notations; Entity Extraction and relations; Shallow Parsing; Syntactic and Semantic Analysis; Text Generation and Summarization; Ontology and Knowledgebase Creation; Sense Disambiguation; Statistical and Rule Based Approaches for NLP Using Machine Learning.

BİL607 Advanced Information Retrieval Systems 3+0 7.5

Information Retrieval Problem: Automation in information retrieval; Term Information Retrieval (IR); Information Science; Indexing and Searching Techniques; Advanced Query Optimizations; Focus on Ranking Functions and Using Machine Larning to Learn the Ranking Functions for the Specific Problems.

BİL612 Data and Text Mining 3+0 7.5

Data and Text Mining; Algorithms used in Data Mining; Application of Data Mining Applications to Text Mining; Classification and Clustering Algoritms; Rule-Based Systems.

BİL613 Machine Learning 3+0 7.5

Introduction to Learning Theory, Learning Algorithms and their Applications; Learning Theory; Estimation; Regression, Categorization with specific algorithms: Least squares, Maximum entropy, Hidden markov models, Artificial neural networks, Support vector machines.

BİL615 Special Topics in Information Technologies 3+0 7.5

Using Information Technologies in Distance Education Applications; Using Information Technologies in Medical Service Applications; Special Software Design Techniques for the Disabled People; Text-to-Speech, Speech-to-text conversion and applications.

BİL616 Pattern Recognition Applications 3+0 7.5

Mathematical Preliminaries; Pattern and Feature; Feature Extraction; Feature Selection; Classification; Linear and Quadratic Classifiers; Bayes Decision Theory; Subspace Methods; Principal Component Analysis (PCA); Linear Discriminant Analysis (LDA); Cluster Analysis; Combined Classifiers; Pattern Pre-Processing and Post-Processing; Recognition Performance Analysis; Various Pattern Recognition Applications.

BİL617 Cryptology 3+0 7.5

Classical Cryptography and Cryptoanalysis; Number Theory; Shannon Theory; Cryptographic Hash Functions; Iteraritve Hash Functions; Message Correction Codes; RSA and Prime Factorization Algorithms; Discrete Logarithm Method and Elgamal Crypto System; Elliptic Curves; Signature Methods.

BİL619 Advanced Discrete Mathematics 3+0 7.5

Linear Algebra; Subspace Fundamentals; Probability Theory and Random Variables; Principal Component Analysis; Nonlinear Optimization; Graphs; Trees; Path Problems; Planar Graphs; Pairing Problems; Coding Theory.

BİL620 Multi Agent Systems 3+0 7.5

Introduction to Intelligent Agents; Deductive Reasoning Agents; Practical Reasoning Agents; Reactive and Hybrid Agents; Multiagent Interactions; Communication; Working Together; Methodologies; Multiagent Decision Making; Applications of Multi Agent Systems.

BİL621 Text Analytics 3+0 7.5

Business Analytics; Text Analysis; Text Analytics; Text Representation: Preprocessing tech-niques, Feature extraction, Feature selection, Feature projection; Information Extraction from Text; Crawling; Indexing; Searching; Text Categorization; Text Clustering; Application of Text Algorithms over Big Data; Algorithm Selection and Evaluation; Multilingual Text Ana-lytics; Semantic Analysis.

BİL623 Advanced Engineering Mathematics 3+0 7.5

Linear Equations; Laplace Transforms; Rectangular Systems and Echelon Forms; Matrix Algebra; Vector Spaces: Space, Subspace, Basis and dimensions, Linear transformations, Change of basis; Norms; Orthogonality; Gram-Schmidt Procedure; Discrete Time Signals; Fourier Analysis; Fourier Transforms; Time Frequency Analysis; Z-transforms and Filters; Determinants; Eigen Values; Eigenvectors; Probability: Combinatorics, Random variables, Conditional probability, Expectation, Limit theorems; Bayesian Learning Methods; Markov Chain; Monte Carlo; Optimization: Gradient descent algorithm, Newton method.

BİL624 Deep Learning Theory and Applications 3+0 7.5

Feed Forward Neural Networks; Deep Learning Optimization Methods; Eigen Value Decomposition; Principal Component Analysis; Singular Value Decomposition; Deep Autoencoders: Denoising autoencoders, Sparse autoencoders, Contractive autoencoders; Regularization: Early stopping, Noise injection, Ensemble methods; Deep Convolutional Neural Networks; Deep Reinforcement Learning; Sequence Learning Problems; Deep Recurrent Neural Networks; Long Short Term Memory Cells;

Gated Recurrent Units; Encoder Decoder Models; Attention Mechanism; Directed Graphical Methods; Generative Adversarial Networks.

BİL692	**Seminar**	**3+0**	**7.5**
BİL790	**Thesis**	**0+1**	**30.0**
BİM790	**Thesis**	**0+1**	**30.0**
BİM890	**Thesis**	**0+1**	**30.0**
BİM890-0	**Thesis (Thesis Proposal)**	**0+1**	**30.0**

BİY501 Herbarium Techniques 3+0 7.5

What is Herbarium? Collecting Plant Samples; Plant Drying Method; Sticking the Plant Samples on the Herbarium Cartons; Labeling the Plant Samples and Recording to Cartotext; Settling the Herbarium Material to Herbarium With a Specific Order; Herbarium Types; Preservation of the Plant Taxa; How Can We Benefit From the Herbarium?

BİY502 Methods of Plant Identification 3+0 7.5

Collecting Plants; Studying Plant Specimens in Herbarium; Herbarium Techniques; Necessities When Making Herbarium Materials; How to Use Flora of Turkey and the East Aegean Islands; Key Types For Determining Plant Taxa; Determining Comparison Material; Publication Process After Determining the Plant Specimens.

BİY505 Bacteriology 3+0 7.5

The Bacteria; What Are Bacteria; The Bacterial Cell; Growth and Reproduction; Differentiation; Metabolism; Energy Metabolism; Carbon Metabolism; Bacteria Genes; Bacteria Ophages; Bacteria in the Living World; Applied Bacteriology; Food-Bacteria; Feeding Animal; Biopol; Bacteria in Meolicine; Some Pratical Bacteri Ology; the Identification and Classification of Bacteria.

BİY506 Enzymatic Regulation 3+0 7.5

Enzymes; Description; Biochemical Structures; Classification; Factors That Are Affecting the Enzymes Activities; Enzymatic Inhibitors; Competitive and Non-Competitive Inhibition; Determination of the Active Center In Enzymes; Co-Factors and Co-Enzymes; Allosteric Enzymes and the Regulation of Allosteric Enzyme's Metabolic Pathways; Synthesis; Gaining of Tertiary Structure And Release of Enzymes Will Be Taught.

BİY507 Biology of Lichens 3+0 7.5

Historical Development of Lichenology; Anatomical and Morphological Features of Lichens: Cortex; Medulla; Algal Layer, Structure and Functions; Reproduction Mechanisms of Lichens; Sexual Reproduction; Types of Fructification; Vegetatif Reproduction; Isidia; Soredia; Blastidia; Physiological Features; Photosynthesis; Respiration; Unique Lichen Substances; Ecological Features; Biogeographical Features; Economical Usages of Lichens; Classification of Lichens.

BİY509 Special Histology 3+0 7.5

Cardiovascular System; Blood Vessels; Lymphatic System; Reticuloendothelial System; Endocrine System; Urinery System; Reproductive System; Male Reproductive System; Female Reproductive System; Respiratory System; Excretory Respiratory Organs; Lungs; Digestive System; Stomach; Intestines; Pancreas; Liver.

BİY510 Flora of Turkey 3+0 7.5

Historical Development on the Floristic Studies in Turkey: Algae; Liverworts; Fungi; Vascular Plants; What Is a Flora Element?; Floristic Regions in the World; Geographical Areas of Turkey: Their Topographic and Climatic Features; Composition of Flora of Turkey; Evaluation of Floristic Regions of Turkey (Euro-Sibirian, Mediterranean and Irano-Turanian): Their Features and Characteristic Taxa; Endemism: Endemic Taxa of Turkey and their Distribution Areas.

BİY511 Gene Regulation 3+0 7.5

Evidence For Gene Regulation in the Cell and Related Methods; Gene Regulation at DNA Level; Amount and Types of DNA in Different Cell Types; DNA Loss; DNA Amplification; DNA Rearrangement; Tissue-Specific Expression of Proteins and Mrnas; Regulation at Trancription Level: Chromatin Structure; DNA Sequence Elements; Transcription Factors; Post-Transcriptional Regulation; Mrna Splicing; Life of RNA; Regulation of Translation; Gene Regularion and Cancer; Genetic Regulation of Immune System; Regulation of Mating-Type in Yeast.

BİY512 Principles of Zoological Nomenclature 3+0 7.5

Zoological Nomenclature; Number of Words in Zoological Names; Criteria of Publication; Criteria of Availability; Date of Publication; Validty of Names; Formation and Emendation of Names; Taxa of the Family 'Group and Their Names; Taxa of The Genus 'Ggroup And their Names; Taxa of the Species 'Group and their Names; Authorship; Homonymy; the Type-Concept.

BİY513 Advanced Cell Physiology 3+0 7.5

Macromolecular Structures That are Forming Cellular Organelles; Biochemistry of Membrane and Membranal Transportation; Connective Complexes in-Between Cells And Cellular Communication; Function and Structure of the Golgi Complex; Mitochondria; Lysosome and Peroxisome; the Role of Camp in the Regulation of Cellular Physiology; the Functional Mechanisms of Calcium-Calmodulin; Mechanisms of Cellular Differentiation Will Be Taught.

BİY514 The Harmful Insects 3+0 7.5

Introduction; Living and Nutrition of Insects; Parasits of Fur and Pelt; Ceratine Consuming Insects; Predatory Insects; Water Insects; Plant Insects; Harmful Insects of Wood; the Poisonous Insects; Patogenic Insects; Insects as Vectors of Diseases; Groups of Harmful Insect and their Damages.

BİY515 Forest Ecology 3+0 7.5

Introduction; Basic Principles of Ecology; Definition of Factors Forming Forest Ecosystems; Reciprocal Effects and Relations Between Factors Forming Forest Ecosystems; Yield Power of Forest Ecosystems; Prediction and Classification of Yield Power; Investigation of Forest Community According to Sociological Principles.

BİY516 Bioenergetics 3+0 7.5

Principles of Bioenergetics, Glycdysis and the catabolism of Hexoses, The citric acid cycle and control of ATP prodiction, Oxidation of Fatty Acidy, Amino Acid Oxidation and the prodiction of urea, Oxidative Phosphorylation and Photophosphorylation. Carbohydrate Biosynthesis, Lipid Biosynthesis, Biosynthesis of AminoAcids, Nucleotides and Related Molecules Intey İntegration and Hormonal Regulation of Mammalian Metabolism.

BİY517 Water Pollution and Biological Effect 3+0 7.5

The Factors That Cause Pollution in the Marine and Freshwater; the General Characteristics and Effects of Various Types of Pollutants on the Aquatic Environment; Chemical Pollution: Hydrocarbons, Pesticides; Detergents; Heavy Metals; Domestic Pollution; Aerobic and Anaerobic Mineralization; Radioactive Pollution; Red-Tide and Pollution; General Effects and Results of Eutrophication in the Standing Water; Bioaccumulation: Accumulation in Plants; Invertebrates and Vertebrates; Water Quality.

BİY518 Signal Transduction in The Cell 3+0 7.5

Types and Structure of Receptors Located on the Cell Membrane; Types and Structure of Ligands Bound Receptors; Mechanism of Signal Transduction Through the Cell Membrane; Mechanism of Signal Transduction in the Cell; Secondary-Messenger Molecules and Their Functions; Importance of Calcium Ion ın Signal Transduction; SH2; SH3 and PH Domains of Proteins; MAP-Kinases; Termination of Signal; Signalling in he Nucleus; Nuclear Responses; Transcription Factors; the P53 Tumor Repressor; Cell Cycle Regulation; Cancer and Signalling Through Growth Factors.

BİY519 Limnology 3+0 7.5

Introduction to Limnology; Features of Freshwater and their Classification; Standing Water; Physical; Chemical and Biologic Features of the Standing Water; Thermal Stratification ünd Classification of Lakes; Running Water; Physical; Chemical and Biologic Features of the Running Water; Food-Chain Dynamics in the Water; the Major Groups of Organisms in Lakes and Streams; Pytoplankton; Zooplankt; Periphyton; Neuston; Nekton; Applied Limnology.

BİY520 Bacterial Plant Diseases 3+0 7.5

Introduction; Role of Bacteria in Plant Diseases; Classification of Plant Pathogenic Bacteria; Agrobacterium; Corynebacterium; Erwinia; Pseudomonas; Xanthomonas; Streptomyces; Symptoms of Bacterial Diseases; Identification of Plant Pathogenic Bacteria; Host-Pathogen Relations; Pahogenicity and Virulence Factors; Genetics of Bacterial Plant Diseases; Epidemiology of Bacterial Plant Diseases and Control of Disease.

BİY521 Biophotography 3+0 7.5

Variety of Photographic Cameras; Using Objectif for Photographic Cameras; Filters; Using Diafram; Obturator; Visor and Its Variety; Macro and Mikro Photography; Lighting and Periods; Arroneous Photography; Photographic Solutions; Films Developing; Card Developing; Measuring With Photograph; Photograph Reading.

BİY522 Investigation Methods of Ecosystems 3+0 7.5

Natural Selection and Speciation; Conditions for Life; Population Ecology; Community Organization and Structure; Ecosystem Dynamics; Diversity of Ecosystems; Definition of Genus and Characteristics of Elements Forming Ecosystem; Production of Organic Substance in Ecosystems; Energy and Material Flow and Their Depositions and Changes; Circulation of Food Substances; Investigation of Ecosystems.

BİY523 Zootaxonomy 3+0 7.5

The Principles of Animal Classification; Importance of Taxonomy; Category of Species; Categeries of Subspecies; Taxonomy of Population; Teories of Classification; Aims of Classification; The High Categories; The High Taxa; Methods of Animal Classification; Taxonomic Collections; Methods of Idendification; The Materials Point of Revision and Monography; Taxonomic Characters.

BİY524 Fishery Biology and Population Dynamics 3+0 7.5

The Factors that Effect on Efficiency of Fish Stocks in tThe Marine and Freshwater; Fish and Fisheries; Sampling and Statistical Methods for the Fishery Biology; Metric and Countable Features for the Fishery Biology; Studies of the Age; Growth; Sexual Distinction and Spawning of the Fishes; the Relationships Between Length and Weight of the Fishes; Methods for Estimating the Potential Fish Population Dynamics of Aquatic Environment; Up Welling and Fish Production.

BİY525 The Collection Methods of Invertabrate Animals 3+0 7.5

Introduction; Biological Ecozones; Terrestrial Environment; Maritime Environment; Aquatic Environment; Collecting; Killing; Fixation; Preserving; Collections of the Main Invertabrate Animal Groups; Collection of Protozoa; Collection of Porifera; Collection of Coelenterata; Collection of Ctenophora; Collection of Plathelminthes; Collection of Rotifera; Collection of Nematoda; Collection of Annelida; Collection of Arthropoda; Collection of Mollusca; Collection of Echinodermata.

BİY526 Cytogenetics 3+0 7.5

Molecular Organization of Chromosome. Chromosome Morphology; Chromosome banding tecniques. Structural and numerical chromosome mutations: Description and interpretation of mutations on chromosomes. Obtaining and Marking of the Prophase and Promethaphase Cells. Determination Prosedure about Number and Size of Ginosimes without the Use of Karyotype Analyze. Slide Preparation Procedures Invitro and In vivo Cytogenetic Investigations: Investigation and evaluation of mitosis and meiosis chromosome on plant; Investigation and evaluation of mitosis and meiosis chromosome on animal.

BİY527 Plant Microbiology 3+0 7.5

Introduction; Microorganisms as Saprotrophs and Plant Pathogens; Penetration of Pathogens Into Host; Mechanical and Chemical Barriers to Infection; The Hypersensitive Reaction; Microbiology of Flowers; Microbiology of Seeds; Microbiology of Fruits; Microbiology of Living Leaves; Microbiology of Stems; Microbiology of Roots and Mycorrhizas; Decomposition of Plant Litters; Industrial Fermentations of Plant Litter.

BİY528 DNA Repair Mechanisms 3+0 7.5

Mutations: Spontaneous v.s induced mutations, Gametic v.s somatic mutations, Other categories of mutations; Mutations arise in different ways: Tautomeric shifts, Base analogues, Alkylating agents, Apurinic sides and other lezions, UV Radiation and Thymine dimers; DNA Repair Systems: Photoreactivation repair, Excision repair, Proofreading and Mismatch repair, Double strand break repair in Mammals

BİY529 Landscape Ecology 3+0 7.5

Natural Ecological Factors Forming Structure of Landscape and Their Relation; Climatic Factors; Definition; Ecological Importance and Functions in Landscape; Soil Factor; Definition; Ecological Importance and Functions in Landscape; Relief Factor; Definition; Ecological Importance and Functions in Landscape; Biotic Factors and their Ecological Importance; Plant as Structure Element of Landscape; Definitions of Air Pollution; Water Pollution; Soil Pollution; Radiation Pollution and Noise Pollution; Ecological İmportance and Reciprocal Relation of Landscape Elements; Basic Knowledge Concern to Ecological Need of Plants.

BİY530 Plant Tissue Culture 3+0 7.5

Culture of Plant Cells; Tissues and Organs; A Plant Tissue Culture Laboratory; Aseptic Techniques; Nutritional Components of Tissue Culture Media; Protoplast Fussion; Protoplast Isolation; Protoplast Culture; Callus Culture; Embryo and Ovul

Culture; Meristem Culture; Anther and Pollen Culture; Secondry Products From Cultured Cells and Organs; Rekombinant DNA Isolation; Organogenesis.

BİY531 Immunology 3+0 7.5

Introduction; Cells and Organs of Immun System; Properties of Antigens; Immunglobulins; Polyclonal and Monoclonal Antibodies; Immun Response; The Complement System; Immune Tolerance and Autoimmunity; Antigen-Antibody Reactions; Serological Reactions; Agglutination; Precipitation; Immunoelectrophoresis; Notralisation; Fluoresent Antibodies; Enzyme-Linked Immunosorbent Assay; Radioimmunoassays.

BİY535 Mineral Feeding Physiology in Plants 3+0 7.5

Element Concepts in Plants; Necessary Elements for Vascular Plants; Research Methods for Plant Nutrition; Types of Different Elements in Soil; Incoming the Mineral Elements to Plant and Transportation; Transportation of Mineral Elements in Plants; Circulation of Mineral Elements; Functions of Necessary Mineral Elements and Mineral Deficiency Symptoms; Köklerin Tuz Alinimini Etkileyen Faktörler; Temperature; Light; Airing Position; pH; Interactions Among Ions; Growing; Plant Nutrition From Leaves.

BİY537 Stress Physiology in Plants 3+0 7.5

Stress Terminology; Responses of Plants to Stress Factors; Levels of Expression; Submolecular Level; Free Radicals (FR) and Related Active Oxygen (AO) Species. Ual Functions of FR and AO; Protection; Amage; Signalling; Regulation of FR and AO; Molecular Level; Secondary Metabolits Involved in Stress; Polysaccarids; Stress Proteins; Normal Cell Constituents of Particular Importance for Stress; Subcellular Level; Regulation of Stress Responses; Hieracy of Stresses. Cross Protection; Bases and Practical Use; Methods for Stress Diagnostic and Stress Control.

BİY538 Vegetation Ecology 3+0 7.5

Description of the Vegetation in a Specific area; Definition of Vegetation Science; Vegetation Types and Determining Plant Associations Floristically and Ecologically; Determining Analitic and Synthetic Characters; Determining Sistematic Categories of Plant Associations in Methodology (Analitic And Synthetic Categories).

BİY539 Microbial Enzymes and Biotechnology 3+0 7.5

Enzyme Structures; Classification and Nomenclature; Production of Enzymes by Fermentation; Methods of Enzyme Purification; Enzymes Immobilization; Production of Enzymes Bymicroorganisms; Bacterial Enzymes; Fungal Enzymes; Application of Enzymes Intextile; Detergent and Leather Industries. Application of Enzymes on Food and Production of Animal Nutritions; Application of Enzymes in Pharmaceutical and Chemical Industries.

BİY543 Plant Molecular Biology 3+0 7.5

Tripartite plant genomes and their inheritance; Overview of nuclear gene structure and function; Organization of nuclear genomes; Agrobacterium-mediated transformation; Transgenic plants and biotechnology: Creating transgenic plants, Gene systems for crop improvement, Herbicide resistance, Salt tolerance, Ethylene and fruit ripening, Disease resistance, Edible vaccines, Plantibodies, Gene silencing; Promoter activity and transcription factors: Cauliflower mosaic virus 35S promoter, Auxin-responsive promoters; Pre-mRNA processing; Chloroplast genomes: Organization of chloroplast DNA, Regulation of chloroplast gene expression, Transplastomic plants; Mitochondrial genomes: Organization of mitochondrial DNA, Mitochondrial gene expression, Cytoplasmic male sterility; Transposable elements in plants; Self-incompatibility in flowering plants.

BİY545 Advanced Biochemistry 3+0 7.5

Chemistry of Carbohydrates; Carbohydrate Metabolism; Oxidative Phosphorilation; Pentoz Phos Phate Metabolic Pathway; Chemistry of Lipids; Oxidation of Fatty Acids; Lipid, Biosynthesis, Photosynthesis, Structure Of Nucleic Acids; Synthesis of Nucleic Acids; The Gene and Genetic Code; Description and Classification of Proteins; Classification of Amino Acids; Reactions of Amino Acids; Protein; Biosynthesis; Enzymes and Coenzymes; Amino Acid Oxidation.

BİY546 Methods of Genetic Taxicology 3+0 7.5

Importance of Genetic Toxicology; Investigating Mutagenesis-carcinogenesis; Genotoxicity Detecting Methods: Bacterial tests for gene mutations, Mammalian cell tests for gene mutations, In vitro and in vivo mammalian cell tests for cytogenetic damage; Chromosome aberration assay, Sister chromatid exchange assay, Cytokinesis block micronucleus assay; Detecting Methods of Gene Mutations at Molecular Level.

BİY547 Forest and Park Trees 3+0 7.5

Description of Organs of Woody Plants; Root; Stem, Bark; Shoot; Bud; Leaf; Flower; Fruit; Seed; Position of Forest and Park Trees in Plants World; Importance; Its Evaluation in Biodiversity Aspect; Nomenclature in Plants; General Characteristics of Spermatophyta; General Characteristics of Gymnospermae and Angiospermae; Spreaded Woody Plant Taxa in the World and Their Characteristics; Forest and Park Trees Grown in Turkey: Biological Features; Ecological

Demands; Evaluation of Woody Plants as Plant as Plant Material: Use; Production; Maintenance; Project Principles in Park and Garden Planning.

BİY548 Modern Biotechnology 3+0 7.5

Isolation of Cultures; Screening for Activities; Culture Preservation and Inoculum Development; Small-Scale Liquid and Solid-State Fermentations; Cell and Enzyme Immobilization; Contınuous Culture; Methods for Biocatalysis and Biotransformations; Raw Materials Selection and Medium; Development for Industrial Fermantation Processes; Purification and Characterization of Proteins; Biological Biocontrol; Polyhydroxyalkonoates; Antibiotic Resistance Mechanism of Bacterial Pathogens; Genetics of Bacteriocins Produced by Lactic Acid Bocterio and their Use in Novel Industrial Applications.

BİY549 Modern Methods for Microbial Identification and Typing 3+0 7.5

Introduction; An Overview of Microbial Identification; Modern Methods for Microbial Classification; Numerical Taxonomy; Nucleic Acids in Bacterial Taxonomy; Analysis of Plasmid DNA; Analysis of Chromosomal DNA; Restriction Enzymes in Analysis of Nucleic Acids; Nucleic Acid Hybridization Techniques; Nucleic Acid Amplification Techniques and Polymerase Chain Reaction (PCR); Analysis of Protein and Lipopolysaccharide Profiles; Typing and Identification With Antibodies; Fatty Acid Profiling for Identification and Typing; Taxonomical Properties of Bacterial Toxins; Taxonomical Features of Pigments.

BİY550 Molecular Techniques in Systematics 3+0 7.5

Structure of macromolecules and their use in systematics; Electrophoretic separation of proteins; Electrophoresis of seed storage proteins; Enzyme electrophoresis, generation and analysis of data; The nuclear genome of plants: Genaral features and use in systematic studies; Nuclear ribosomal DNA: Structure and use in Systematics; The chloroplast genome and plant systematics

BİY551 Stem Cell Biology 3+0 7.5

What is a Stem Cell?; Embriyonic Stem Cells; Adult Stem Cells; Similarities and Differences between Embryonic and Adult Stem Cells; Regulation of Stem Cell Function; Hematopoietic Stem Cells; Mesenchymal Stem Cells; Isolation of Stem Cells from Different Organs; Stem Cells and Cancer Treatment; Embriyonic Stem Cells and Tissue Repair; Adult Stem Cells and Tissue Repair; Stem Cells and Gene Therapy; Development of Stem Cell Policy at World.

BİY552 Plant Science 3+0 7.5

Characteristics of Plant Cell: Characteristics of Plant Tissues; Characteristics of Plant Organs; Reproduction of Plants: Flower Structure, Fruit; Nutrition Intake in Plants; Plant Growth Conservation; Genetic Sources of Plant, Nomenclature in Plants: Taxonomic Systems; General Characteristics of Spermatophyte, Gymnospermae and Angiospermae; Environment and Adaptation in Plants: Relation Between Plant and Ecosystem: Ecological Life Cycle in Plants; Ecological Adaptation and Evolution: Floristic Plant Geography; Plant Groups and Their Dispersal; World flora Regions; Vegetation Formation and Classes; Ecological Conditions of Vegetation in Turkey; Phytogeographical Regions of Turkey.

BİY553 The Ecology of Bird Communities 3+0 7.5

The Foundation of Avian Community Ecology; The Assembly of Communities; Numbers of Species and Their Abundances; Niche Theory; Ecomorphological Patterns of Communities; Distributional Patterns of Species; Habitat Distributions of Species; Resources and Their Use; Convergence of Species and Communities; Bioenergetic Approaches to Communities; Competition; Other Factors Influencing Community Structure; Temporal Variation of Communities; Future Directions In Avian Community Ecology.

BİY555 Birds of Turkey 3+0 7.5

Basic Characteristics of Birds; Threats to Bird Populations; Extinctions of Bird Species; Red Lists for Birds; Red List Categories and Criteria; Important Bird Regions in Turkey; Nonpasseriformes Species: Status, Distribution and Ecology of Species and Threats; Passeriformes Species: Status, Distribution, Ecology of Species and Threats.

BİY556 Transmission Electron Microscopy and its Applications I 3+0 7.5

History of Microscopes; Light Microscopes and their Varieties; Stereo Microscopes; Dark Field Microscopes; Polarisation Microscopes; Scanning Electron Microscope and Transmission Electron Microscope; Functions of Light and Electron Microscopes their Differencies and Similarities; Systems of Electron Microscopes; Trimming and Ultramicrotome Techniques; Staining; Other Techniques; Enzyme Histochemistry; Electron Immunochemistry; Cryofixation; Ultracryotomy; Preparation of Several Samples for the Transmission Electron Microscope; Preparation of Biological and Metal Samples; Microtomes and Knifes.

BİY557 Transmission Electron Microscopy And its Applications II 3+0 7.5

Preparation Techniques in Transmission Electron Microscopy; Handlig of Specimens and Fixation; Fixative Solutions; Dehydration; Dehydration Transitional Fluids; Embedding Media; Epoxy Resing; Araldite Embedding Mixture; Araldite

Embedding Schedules; Epon Embedding Schedules; Epon Embedding Mixture; Three Hour Embedding Schedule for Biopsies; Non-Urgent Biopsies; Sectioning and Staining; Staining of Thin Sections; Lead Staining Methods; Knives; Block Trimming; Sectioning; Toluidine Blue Staining; Preparation of Blocks For Ultramicrotomy; Ultramicrotomy Techniques; Collection of Ultrathin Sections; Staining of Material For Electron Microscopy.

BİY560 Instrumental Analyses in Biochemistry 3+0 7.5

Risk Factors in Laboratory and Precautions: Risk Sources, Precautions (R ve S indicators) ; Measurement Units, Weight, Balances: Units, Weight measurement and balances; Volume Measurements: Equipments, Calibration; Quality of the Laboratory Water: Quality of the water and its usage, Distillation metods, Test of water purity; Sterilization: Dry and wet heat method; Centrifugation: Usage in clinic laboratory, Types, Theory, Usage, Care; Spectrophotometer: Structure of light, Beer Law, Components of spectrophotometer, Performance parameters, Multiple wavelenght readings; pH meter: H+ Consantrations and pH concept, Working principles of pH meter, Usage, Applications; Electrophoresis: Theory, General method, Types of electrophoresis; Choromatographic Methods: Gas and Liquid chromatography, HPLC.

BİY561 Animal Cell Culture 3+0 7.5

Introduction; Advantages and Limitations of Tissue Culture; Biology of Cultured Cells; Planning and Layout of The Lab, Requirements of a Tissue Culture Laboratory, Aseptic Technique, Safety; Culture Vessels; Media; Preparation and Sterilization; Primary Culture; Cell Lines; Cloning and selection; Cell Separation and Characterization; Differentiation and Transformation; Contamination; Cryopreservation; Quantitation; Cytotoxicity; Specialized Cells; Tumor Cells; Molecular Techniques.

BİY562 Molecular Biotechnology 3+0 7.5

Introduction to Recombinant DNA technology, Molecular biological systems, Manipulation of prokaryotic gene expression, gene expression from strong and regulable promotors, expression of fusion proteins, types of expression vectors, Protein Engineering; Methods of directed mutagenesis in protein engineering, addition of disulphide bonds, Molecular Diagnostics of human diseases based on DNA and DNA sensors; polyclonal and monoclonal antibody production, PCR based diagnostics; Diagnosis of Malaria and sickle cell anemia, Fundamentals of microbial production of therapeutic human proteins, Human gene therapy, patents and patent analysis in Biotechnology.

BİY563 Halophilic Microorganisms and Their Potential in Biotechnology 3+0 7.5

Definition of Halophilic organisms; Halophilic Archaea; Halophilic Bacteria; Halophilic Eucarya; Isolation and cultivation of halophilic microorganisms; Microbial biotechnology; Halophilic Archaea in biotechnology; Halophilic Baceria in biotechnology; Halophilic Eucarya in biotechnology; General Overview.

BİY565 Extremophiles 3+0 7.5

Extremophile Microorganisms and Techniques Used to Handle Them; Thermophiles; Psychrophiles; Alkaliphiles; Acidophiles; Halophiles; Barophiles; Radiation-Resistant Microorganisms; Applications with Extremophiles; General Overview.

BİY567 In-Vitro Techniques 3+0 7.5

Cell line techniques, cell adhesion, Cell proliferation, Cell differentiation, Energy metabolism of cell, In-vitro cell proliferation techniques, Cytotoxicity techniques, Mutagenicity and toxicity techniques, Flow-cytometry, In-situ hybridization, Cell dye and preparation techniques, Fluorescent- imminofluorescent dye techniques, apoptosis techniques.

BİY571 Taxonomy 3+0 7.5

Taxonomy and Systematic: Development of species concept, Classification systems, Rules of nomenclature; Viruses, Viroid and Prions; Diagnostic Characters and their classification of Archaea and Bacteria: Techniques and applications; Classification of Eucaria: Current methods and classification systems of microorganisms Algae, Fungi, Plants.

BİY572 Molecular Biology Methods 3+0 7.5

Methods in Protein Analyses: Micro methods in protein chemistry, Qualitative protein methods, Protein purification, Affinity chromatography, Spectrophotometric methods, Electrophoretic methods; Methods in Nucleic Acid Analyses: DNA analysis, DNA isolation and purification, RNA analysis and purification, PCR methods, Hybridisation methods, Cloning and genetic transfer; Serological Methods: Antibody production, Antibody-antigen reactions, ELISA, radio immune and fluorescence assays; Microbial Methods.

BİY574 Foodborn Pathogen Microorganisms 3+0 7.5

Aeromonas; Bacillus Cereus; Brucella; Camplobacter Fefuni; Clostridium Perfringens; Clostridium Botulinum; Pathopenic Escherichia Coli; Listeria Monocytopenes; Pseudomonas; Yersinia Enterocolitica; Salmonella; Shigella; Staphylococcus Aureus; Streptococcus; Other Pathogenia and Toxigenic Bacteria; Toxigenic Fungi and their Mycotoxins; Protozoan and Helminthic Parasites; Selective Isolation Techniques.

BİY575 Microorganisms and Biotechnology 3+0 7.5

Isolation of Cultures; Screening for Activities; Culture Preservation and Inoculum Development; Small-Scale Liquid and Solid-State Fermentations; Cell and Enzyme Immobilization; Continuous Culture; Methods for Biocatalysts and Biotransformation; Raw Materials Selection and Medium; Development for Industrial Fermentation Processes; Purification and Characterization of Proteins; Biological Biocontrol; Polyhydroxyalkonoates; Antibiotic Resistance Mechanism of Bacterial Pathogens; Genetics of Bacteriocins Produced by Lactic Acid Bacteria and their Use in Novel Industrial Applications.

BİY577 Enzyme Technology 3+0 7.5

Structure and functions of the enzymes, catalysis mechanisms of the enzymes and enzyme kinetics, enzyme activity units and fundamental of activity measuruments, classification of the enzymes and characteristic enzyme reactions, inactivation and control of the enzymes. Sources of the enzymes, principles of the enzyme production from microorganisms, enzyme extraction, isolation from different sources and industrial applications.

BİY578 Arachnology 3+0 7.5

Taxonomy of Arachnida; Scorpionida: Taxonomy, Morphology, Anatomy, Biology,Ecological specifications: Solifugae: Taxonomy, Morphology, Anatomy, Biology,Ecological specifications: Acarina: Taxonomy, Morphology, Anatomy, Biology,Ecological specifications, Struggle methods; Opilionida: Taxonomy, Morphology, Anatomy, Biology, Ecological specifications: Pseudoscorpionida: Taxonomy, Morphology, Anatomy, Biology,Ecological specifications: Araneae: Taxonomy, Morphology, Anatomy, Biology, Ecological specifications: Arachnida venoms and effects.

BİY579 Plant Bacteriology 3+0 7.5

Plant associated bacteria: Molecular phylogeny and genomics; beneficial bacteria: Rhizobium-legume symbioses, nitrogen fixing bacteria, epiphytic bacteria, bacterial endophytes; Rhizosphere bacteria: plant growth promoting rhizobacteria, systemic resistance and root colonization; Plant pathogenic bacteria: Agrobacterium, Clavibacter, the soft rot Erwinia, Pseudomonas, Xanthomonas, Ralstonia, Burkholderia, Acidovorax and Herbaspirillum.

BİY581 Permaculture 3+0 7.5

Introduction to Permaculture (Ecological Design): The philosophy of permaculture, Ethics, Concepts and themes in permaculture, Methods in Permaculture: Analysis, Observation, Data overlay, Flow charts, Zone and sector analyses, Design: Ecological systems and their characteristics, usage of ecosystem principles in design, design of sustainable agroecosystems, Ecological Cycling in Design; Usage of Biotic and Abiotic Factors in Permacultural Applications: Climatic factors, Plants, Water factor, Soil factor, Strategies for Different Ecological Environments: Humid Areas, Drylands, Wetlands, The Strategies of an Alternative Global Nation.

BİY582 Cyanobacteria and Biotechnological Applications 3+0 7.5

Cyanobacteria and Morphological Diversity, Biodiversity of Marine Cyanobacteria, Biodiversity of Freshwater Cyanobacteria, Cyanobacteria of Extreme Environments, Cyanobacterial Associations, Molecular Identification Methods of Cyanobacteria, Potential Applications of Cyanobacteria in Biotechnology, Cyanobacterial Bioactive Compounds, Cyanobacterial Bioplastics, Cyanobacterial Consortia for Bioremediation Purposes, Cyanobacterial Alternative Energy Sources, Cyanobacteria as Biofertilizers, Cyanobacteria as a Healthy Food Source, Cyanobacterial Emulsifiers

BİY583 Methods of Ecological Analysis 3+0 7.5

Introduction to Ecological Analysis: Basic Principles, Importance and necessity of ecological analyses; Quantitative Ecology; Application Related to Climatic Factors, Application Related to Plant and Soil Factors; Determination of Biological Diversity and Species Richness: Simpson index, Shannon diversity index, McIntosh diversity index; Floristic Quality Index: Basic principles and methods, Relationships between ecological factors and floristic quality index; Water Quality Index; Conservation Priority Areas; Analysis and evaluation; Applications Related to Classification Methods of Vegetation; Evaluation of the Data.

BİY584 Advanced Microbial Physiology 3+0 7.5

Introduction to Microbial Physiology, Macromolecular Synthesis and Processing: DNA, RNA, and protein synthesis, cell structure and function, bacterial growth, environmental effects and strategies, Genetic Adaptation I: Bacterial genomes, plasmids and mutations, Genetic Adaptation II: Transposable elements and genetic exchange, Regulation of Enzyme Activity and Gene Expression, Energy and Metabolism: Carbohydrate metabolism, Energy production and metabolite transport, metabolism of substrates other than glucose, Fermentation pathways, photosynthesis and inorganic metabolism, bacterial cell division, Microbial Stress Responses, Bacterial Differentiation, Host?Parasite Interactions.

BİY585 Advanced Biochemistry and Metabolism 3+0 7.5

Metabolism of Carbohydrates: Energy metabolism of glucose, Pyruvate metabolism, Biosynthesis of carbohydrates, Regulation of metabolism; Production of NADH and NADPH: Citric acid, glyoxylate and phosphogluconate cycles;

Electron Transport Chain: Mitochondrial electron transport, Oxidative phosphorylation, Photosynthetic electron transport; Metabolism of Fatty Acids: Catabolism and biosynthesis of fatty acids, Regulation of metabolism; Metabolism of Amino Acids: Nitrogen cycle, Biosynthesis and catabolism of amino acids, Urea cycle; Integration and Coordination in Metabolism: Overall strategies of metabolism, Metabolic control by hormones.

BİY586 Systematics of Lichens 3+0 7.5

Taxonomic Classification of Lichens; Important Taxonomical Characteristics Used for the Identification of Lichens; Classical, Chemotaxonomic and Molecular Methods Used for the Identification of Lichens; Collection of Lichens: Field study and collection methods; Use of Different Keys in Lichen Identification; Identification of Crustose, Foliose and Fruticose Lichens; Designing Different Types of Identification Keys; Describing Lichens, and Defining Diagnostic Characteristics of Lichens; Lichens Used as Herbarium Samples: Entry into database and use of preservation techniques.

BİY591 Advanced Molecular Biology and Genetics 4+0 7.5

Cell Chemistry: Chemical equilibrium, Biochemical energetics; Proteins: Biosynthesis, Folding, Post-modifications after folding, Functions and regulation of proteins; Nucleic Acids: Organizations, Functions and regulation of nucleic acids; Cell Structure and Function: Transport of molecules, Signal transduction, Organization and movement of the cell; Cell Growth and Development: Cell cycle and regulation; Genetic Mechanisms: Genome replication, gene mutations and recombination mechanisms, DNA repair; Applications of Molecular Genetics: Physical and genetic mapping, Identification of genes, DNA sequencing techniques, Transcriptome and the proteome studies.

BİY592 Seminar 3+0 7.5

BİY593 Toxicology 3+0 7.5

Introduction to Toxicology: Description, History and classification; The Effects of Toxic Substances; Entrance Ways of Toxic Substances to the Organism, Their Distribution and Excretion; The Metabolism of Toxic Substances; Toxicokinetics; Mechanisms of Toxic Action; Genetic Toxicology; Chemical Carcinogenesis; Teratogenesis; Systemic Toxicology: Neurotoxins, Liver toxins, Renal toxins, Respiratory toxins, Haematotoxicity, Immunotoxicity; Drug Toxicity; Environmental Toxic Substances.

BİY594 Nanomedicine and Application Fields 3+0 7.5

Definition and History of Nanobiotechnology; Scientific Approaches in Nanotechnological Production; Applications of Biological Nanoparticles; Bionanomaterials and Their Properties; Electron Microscopy Technique in Nanotechnology; Production of Bionanomaterials; Nanotechnology in Disease and Health: Genes and nanochip applications; Biosensors; Drug Carrier Nanosystems; Bionanomaterials and Toxicity; Medical Nanotechnology and its Usage: Targeted therapy; Scientific Discussion are Aimed in This Course.

BİY599 Term Project Course 3+0 0.0

BİY601 Microbial Laboratory Techniques 3+0 7.5

General Information, Cultural Counting Methods, Microscopic Counting Methods, Standard Based Counting Methods, Metabolism Based Counting Methods, Other Counting Methods, Biochemical Tests, Media and Sterilization; Indicator Microorganisms, Taking Sample for Analysis and Preparation of Samples for Analysis; Hydrophobic Grid Membrane Filter Technique; Direct Epifluorescence Microscopy Technique; Electric Impedance Method; Bioluminescence Method.

BİY602 Water Microbiology 3+0 7.5

Microbiology of Source Water; Freshwater Microbiology; Marine Microbiology; Microbiology of Drinking Water; Waste Water Microbiology Deep-Sea Microbiology Hydrothermal Vents; Methods in Water Microbiology; Sampling Methods; Determination of Biomass; Isolation Methods; Identification; Viability Using Staining Techniques; Microbial Activity Measurements; Radio Isotopes and Microelectrodes.

BİY603 Environmental Pollution and Plants 3+0 7.5

Evaluation of Environmental Pollution; Morphological; Anatomical and Physiological Effects of Air Pollution on Plants; Morphological; Anatomical and Physiological Effects of Water Pollution on Plants; Physiological; Morphological and Anatomical Effects of Soil Pollution on Plants; Description of Biomonitor and Bioindicator Organisms; Their Features and Uses for Determination of Environmental Pollution; Databanks; Their Purposes and Methods.

BİY604 Recombinant DNA Technology 3+0 7.5

What is Gene Cloning; What are used for Gene Cloning; Purification of Fragments by Restriction Enzymes; Analyzes of Fragments; Ligation; Transformation; Selection of the Cell Having Recombinant DNA; Why is the Gene Cloning is Important; What are the Areas That Recombinant DNA can be used for.

BİY605 Animal Tissue Culture 3+0 7.5

Advantage and Disadvantage of Tissue Culture; Using Technical Materials of Tissue Culture; Investigation Techniques of Tissue and Cell Culture; Peculiarity of Cel Culture Laboratory; Interactions of Cell; Cell and Human Interactions; Damaging for Tissue and Cell Culture; Some Special Solutions for Cell Culture; Serums for Cell Culture; Isolation of Tissue and Cell; Primer Cell Culture; Cell Lines; Keeping and Storing Cells; Investigation Techniques of Cultured Cells.

BİY606 Yeast Science 3+0 7.5

Introduction and History of Yeast; History of Yeast Classification; The Architecture of Yeast Cell; Nutrition and Metabolism of Yeast; Nutritional Requirements; Regulation of Metabolism; Cell Biology of Yeast; Cell Growth and Division in Yeast; Cell Cycle; Sexual Reproduction in Yeast; Isolation and Identification of Yeast; Yeast Genetics and Genetic Manipulation; Yeasts in Industry.

BİY607 Oceanology 3+0 7.5

Historical Development of Oceanology; Biological Oceanography: Classification of Marine Environment; Classification of Marine Organisms; Organic Matter Yields of Marines. Marine Resources and Their Benefits: Biological Resources; Chemical Resources; Geological Resources; Physical Resources. Chemical Oceanography; Physical Oceanography; Geological Oceanography; Some Subjects from Practical Biological Oceanography; Fouling and Boring Organisms; Main Tools Needed in Oceanographic Research.

BİY608 Advanced Endocrinology 3+0 7.5

Hormones; Description and Classification; Synthesis and Secretion of Hormones; the Effects Mechanisms of Hormones; Control of Hormonal System By Hypothalamus; Hormones of Pituitary Gland; Hormones of Thyroid; Hormones of Parathyroid Glands; Hormones of Pancreas; Hormones of Adrenal Glands; Hormones of Gonadal (Sexual) Glands and Hormones of Gastrointestinal Glands Will Be Taught.

BİY609 Parasite Plants 3+0 7.5

Nutrition and Living Types among Plants: Symbiosis, Parasitism, Efinition of Parasite Plant: Evolution of Parasite Plants, Parasite Plants, Semi-Parasite Plants, General Ecological Characteristics of Parasite Plants: Host Plant-Parasite Plant Relationship, Host Specifity of Parasite Plants, Adaptations in Parasite Plants, Classification of Parasite Plants: Some Parasite Plant Group in Turkey, Damages Caused by Parasite Plants.

BİY611 Genomics 3+0 7.5

What is the Genome? Structure Prokaryotic and eukaryotic Genomes, Comparative Genome Sizes of Living things, Packing Stills of Genomes, Genomes of Organelles, Organization of Genes and the Rest of the Genome, Modifications of Genomes, Re-organizations of Genomes, DNA Technology and the Development of Genomics, Genomic Manipulations, Types and Formations of Genomic Libraries, Classic and High-Throughput DNA Sequencing Techniques, Ordering of Genomic DNA Sequences; Bioinformatics, Study of the Published Genomic Projects, the Use of the Produced Genomic Information: Comparative Genomics and Introduction to Proteomics, Influences of the Genomics on Other Sciences, Use and Construction of the DNA Chips and Nanotechnology, The possibility of Developing a High Through Put Machine That Will Evaluate the Genomic Information in Protein Level?

BİY612 Microbial Physiology 3+0 7.5

Metabolical Reactions; Enzymes; Role of ATP and Synthesis of ATP; Oxidation and Reduction Reactions; Electron Transport System; Energy Conservation From Electron Transport; Aerobic Respiration; Anaerobic Respiration; Fermentation; Metabolic Diversity in Microorganisms; Photosynthesis; Oxygenic and Anoxygenic Photosynthesis; Chlorophyll and Bacteriochlorophyll; Nutrition and Sugar Metabolism.

BİY613 Modern Mycology 3+0 7.5

Introduction: Define of Fungi; Growth Forms of Fungi; Activities of Fungi; Fungi in Biotechnology; the Major Taxonomic Groups of Fungi; Structure and Ultra Structure; Fungal Growth; Differentiation; Nutrition; Metabolism; Environmental Conditions for Growth; Genetics; Spores and their Structures; Spore Dormancy and Spore Dispersal; Fungal Decomposer Communities; Fungal Interactions; Fungi as Plant Parasites; Fungal Parasites of Humans; Insects and Nematodes; Prevention and Control of Fungal.

BİY614 Basic Bioinformatics 3+0 7.5

Introduction To Bioinformatics; Basic Molecular Biology; The Evaluation of Nucleotide Sequencing Results; Gene Banks and Their Use; Genomic Databases and Their Use; Protein Expression Databases And Their Use; Cdna And Est Databases

and Their Use; Working With Multiple DNA and Amino Acid Sequences By Alignment; Assembly And Phylogenetic Analyses; The Use Of Various Packet Bioinformatics Programs Such As Web Cutter, Primer Dizayn, Genetool, Petool, BLAST, Entrez, Webphylip, Clustalx, Electronic PCR, Orffinder, and Homologene.

BİY616 Biogeography 3+0 7.5

Physiological Reaction of the Living Things and Adaptation to Habitat; Factors Affecting Spread of the Living Things and Classification of Habitats; Principal Flora Regions of World and Classification of Floristic Unit; Plant Formations and Classes; Biogeography Ecols and Field Relationship; Biological Richness of Turkey; Ecological Comment on Near Geologic Periods.

BİY617 Celluar Signal TransductionPathways 3+0 7.5

Overview of Plants; Bacterial, Animal and Mammalian Signaling Mechanisms and their Origins; Basic Concepts of Cell Surface Receptors; Heptahelical Receptors and Heterotrimeric G Proteins; Receptor-G Protein-Adenylyl Cyclase Coupling; Protein Kinase A; Receptor-G Protein-Phospholipase C-Coupling; Synthesis of Polyphosphoinositides And heir Regulation; Protein Kinase C; Calcium Signaling Via Calmodulin; Growth Factor Receptor Protein Tyrosine Kinases; Ras Signalling; PI 3-Kinase And MAP Kinase Cascades; Cytokine Receptors and JAK/STAT Signaling, Receptor İon Channels; Two Component Pathways İn Prokaryotes.

BİY618 Fhlyogenetic Systematics 3+0 7.5

The Position of Systematics Among the Biological Sciences; General Concepts of Systematics; The Phylogenetic System and Its Position Among the Possible and Necessary System in biology; Tasks and Methods of Taxonomy: Taxonomic Tasks in the Area of the Lower Categories; The species Category in the Time Dimension; The Species Concept and Paleontology, Taxonomic Tasks in the Area of the Higher Group Categories; The Methods of Phylogenetics: The concepts.

BİY620 Forest Vegetation of Turkey 3+0 7.5

Three Phytogeographical Areas of Turkey, Climates and Other Characteristics of these Three Areas of Turkey, Floristical and Syntaxonomic Analyses of Plant Associations Belong to Forest Vegetation Under the Influence of Climate; Main Rock; Soil and Biotic Factors Affected By Oceanic; Black Sea and Central Anatolia Region.

BİY621 Advanced Molecular Genetics 3+0 7.5

Heredity and the phenotype: An Introduction to Genetics, Mendelian an Genetics: The Molecular Basis of Heredity, DNA Structure and Analysis, Translation and proteins; Genomics: Chromosome structure and DNA sequence organization, Organization of Genes in Chromosomes; Genetics of organisms and populations, Developmental Genetics, Genetics and Behavior, Population Genetics

BİY622 Soil Biology 3+0 7.5

Soil ecosystem and properties; Soil organisms; Soil bacteria Actinomycetes, fungi, algae, lichens, viruses Soil fauna, protozoa, worms, pot worms, arthropods, vertebrates; Microbial interactions, competition; The opposite interaction, hunting, co-existence; Mutual benefit Enzyme properties and soil functions; Soil ecosystem development; Decomposition of soil; Organic matter and carbon cycle; Soil nitrogen cycle; Microbiological fertilizer and biocontrol; Soil phosphorus cycle; Soil sulfur cycle, Some trace elements; Microbial transformations

BİY624 Use of Bioindicators in Environment 3+0 7.5

Determination of Environmental Conditions by Using Plants and Animals: Which kind of organisms are useful for this purpose?; Physiological and Morphological Effects of Pollutants on Living Organisms: Changes on the distribution patterns of organisms due to environmental pollution, Some methods and their application on the determination of sulphurdioxide and heavy metal; Determination and Monitoring of Special Habitats of Living Organisms: Lichens and Algae.

BİY625 Special Microscopic Techniques 3+0 7.5

Introduction of High Technology Observation Tools For Biological Studies; Technical Preparation of Microscope, Special Fitness of Microscope; Using a Microscope and Study Principles; Preparation of Biological Materials For Fluorescence Microscope; Co focal Microscope and Scanning Microscope; Techniques of Single and Double Immunochemical Staining; Techniques of Biological Macro graphing; Using Special Microscopic Techniques for Observation And/Or Results; Techniques of Discussions For Microscopy.

BİY626 Enviromental Microbiology 3+0 7.5

Soil Microbiology and Environmental Microbiology Biogeochemical Cycles; Aquatic Microbiology; Air Microbiology; Microorganisms and some novel pollution problems; Xenobiotia molecule; Recalcitrant halocarbons; Poly chlorinateol biphenyl and dioxins; Synthetic polymers; Alkyl benzyl sulfonates; Oil pollution; Crude oil Biodegradation; Pesticides; Microbial Accumulation of Heavy Metals and Radio Nualides Bioremediation.

BİY627 Ecophysiology 3+0 7.5

Introduction; Ecological Factors and their Effects on Plants; Metabolism Physiology in Plants; Translocation in Plants; Biochemical Explanation of Photosynthesis and Respiration in Plants; Nutrition Methods in Plants; Growth; Growth Substances and Their Functions in Plants; Functions of Hormones During Seed Growth; Germination and Germination Types of Plant Seeds; Conditions of Seed Germination and Eliminating the Germination Obstacle; Seed Germination Properties of Economically Important Plants.

BİY628 Genetic Regulation of Development 3+0 7.5

Introduction; Differentiation and Proliferation: Regulation of cell cycle and related molecules; Genetic control of Nematode development: Control Genes And Cell Behavior; Genetic Control Of Drosophila Development: Regional differentiation during embryogenesis, Neurogenesis, Homologous of Drosophila in mammals; Neurogenesis in Mice; Myogenesis in Mammals: Transcription factors and their functions; Oncogenesis.

BİY629 Molecular Taxonomy 3+0 7.5

The Past and Future of Taxonomy; Methods of Systematic; Molecular Taxonomy; Molecular Systematic in Classification of Species; Partial Evolutionary Changes of Local Populations; Variation at DNA Level; Recognition With DNA (DNA Fingerprint); Satellite's DNA in Molecular Taxonomy; Sequences of Ribosomal RNA; Molecular Taxonomy Studies in Various Species.

BİY630 Modern Methods in Plant Taxonomy 3+0 7.5

Cytotaxonomy; Concept and Application Methods; Chemotaxonomy; Concept and Application Methods on the Different Plant Groups; Molecular Biological Methods in Plant Classification: Algae, Mosses and Vascular Plants; Numerical Methods in Taxonomy; Descriptions and Geometric Models; Grouping; Ordination and Discrimination Functions; Pyhlogenetic (Cladistic) Systematic; Introduction of Phylogenetic Methods and their Applications.

BİY631 Ecological Economics 3+0 7.5

What is Ecological Economics?: Basic principles and concepts; The history of ecological economics; Analytic vision for ecological economics; Valuation and Decision-Making Process in Ecological Economics: Ecosystem services, their function and evaluations; Relationship Between Ecological Conservation and Economy; Sustainability in Nature: Indicators of sustainability; Carrying capacity; Human impacts on nature: Ecological footprint and its importance; Calculation; Consumption; Relationships Between Economic Development and Sustainability of Natural Sources: Ecological macroeconomics; Economics of resources; Cost-benefit analyses in nature; Environmental Economy; Environmental Politics; Environmental Planning.

BİY632 Biochemistry of Cancerogens and Mutanges 3+0 7.5

Enzymatic Activation of Polycyclic Aromatic Hydrocarbons; Monoaxygenases, Arylhydrocarbon Hydrolases, Cytochrome P-450 Mechanism, NADPH- Cytochrome 'P450 Reductase System; Epoxide Hydrolases; (Mechanisms, Inductions Etc.); Conjugation Enzymes; Glutathione-S Transferases; Sulfotransferases; UDP-Glucuronil Transferases, Conjugation Reactions; and Carsinogenity Relations; Nucleosid and Nucleotid Alkylating; Invitro Alkylating of Nucleic Acids; in Vivo Alchylation of Nucleic Acids; Bifunction; Alkylating Agents; Circular Alchylation Agents.

BİY633 Economic Botany 3+0 7.5

Classification of Economic Botany; Nutritive Plants; Grain Plants; Vegetables; Plants With Edible Roots; Stems; Leafs; Fruits and Seeds; Plants Having Oil; Seeds Having Oil; Fruits; Fleshy Fruits; Baccate Fruits; Drupe Fruits; Aggregate Fruits; Dry Fruits; Plants That Contain Sugar; Starch and Oil; Flavoring Plants; the Stimulation Plants; Industrial Plants; Pharmacologic and Ornamental Plants.

BİY634 Evolution of Microbial Pathogens 3+0 7.5

Origin of life and earth as a microbial habitat; General concepts of microbial evolution: Studying evolution using genome sequence data; Population dynamics of bacterial pathogens; Microbial adaptation; Pathogenicity islands and evolution; Evolution of microbial pathogens and environment; Evolution of soil pathogens; Evolution of bacterial toxins; Evolution of bacterial resistance; Evolution of enteric pathogens; Evolution of human fungal pathogens.

BİY635 Characteristic Behaviour of Animal Groups 3+0 7.5

The Science of Behavior; Etholoji; Hereditary Behavior; Learned Behavior; Social Behavior; Nest-Building Behavior of Invertebrate Animals; Nest-Building and Mating Behavior of Pisces; Migration Behavior of Pisces; Characteristic Nest-Building Behavior of Birds; Dating Behavior of Birds; Characteristic Feeding Behavior of Birds; Community Behavior in Mammals.

BİY636 Biochemistry of Free Radicals 3+0 7.5

Free Radicals and Reactive Oxygen; Super oxide Radicals; Peroxide Radicals; Biochemical Mechanisms of Free Radicals; Free Radical Enzymes; Glutathione Peroxides; Catalase; Glutathione Reductase; Glutathione-S-Transferase; Free Radicals and Cancer; Free Radicals and Antioxidant Defense Mechanism.

BİY637 Aquatic Entomology 3+0 7.5

Classification of Aquatic Insects; Aquatic Insect Orders and Their Morphologic and Biologic Features: Collembolan; Ephemeroptera; Odonata; Plecoptera; Orthoptera; Hemiptera; Megoloptera; Neuroptera; Coleoptera; Diptera; Lepidoptera; Trichoptera; Hymenoptera; Define Methods of Aquatic Insects; Biological Features of Temporary and Permanent Water; Morphological and Physiological Adaptations of Aquatic Insects; Sampling Techniques; Economic and Ecologic Importance of Aquatic Insects.

BİY638 Archaebacteria 3+0 7.5

Cell Biology; Euryoarchaeota; Extreme Hemophilic Archae, Archae Producing Methane; Thermoplasmates, Hyper thermopilic Euryarchaeota; Crenarchaeota; Habitat and Energy Metabolism; Sulfolobales and Thermoproteales, Desulfurococcales; Living in High Temperature; Isolation Methods of Archaebacteria.

BİY640 Basic Virology 3+0 7.5

Virology and Viral Diseases; General Properties of Viruses and Their Classification; The Virus Host; Quantification and Visualization of Viruses; Host Response to Viral Infection; Replicating and Measuring Biological Activities of Viruses; Characterization of viral genomes; Manipulation of viral genomes; Bacteriophages; Lytic viruses; Lysogeny and Phage Lambda; Animal viruses; Plant viruses; Viroids and Prions.

BİY641 Soil Science 3+0 7.5

Topics and Aim of Soil Science; Main Structure of Soil; Formation and Factors in This Matter; Rocks and Minerals Forming Soil; Decomposition Events Forming Soil; Physical Properties of Soil; Physicochemical Properties of Soil and Soil Organic Material; Chemical Properties of Soil; Biological Properties of Soil; Soil Yield; Main Soil Properties Affecting Yield.

BİY642 Protein and Nucleic Acid Analysis Techniques 3+0 7.5

Molecular analysis of nucleic acids, Restriction enzymes, Restriction and modification of nucleic acids, Marking and identifying nucleic acids, DNA sequence analyses, Micro-array and super-array techniques, Protein purification, Purification techniques, electrophoretic techniques, proteomix.

BİY644 Intracellular Traffic 3+0 7.5

Biosynthetic pathways; Transport of newly synthesized proteins; Vesicular and tubular clusters; Trans- golgi network (TGN); Secretory vesicles; Endocytic pathway; Endosomes and peroxisomes.

BİY645 Biochemistry of Nucleic Acids 3+0 7.5

Biological Functions of Nucleic Acids; Discovery of Nucleic Acids; and Biochemical Formation of Nucleic Acids; Isolation and Characterization of Nucleic Acids; Structures of RNA; Viral Nucleic Acids; Nuclease and their Relationship to Enzymes; Biosynthesis of Mononucleotides; Replication and Biosynthesis of DNA and Biosynthesis of RNA: Transcription; Translation (Biological Function of RNA to Produce Proteins); Catabolism of Nucleic Acids Will Be Taught.

BİY646 Eutrophication in Lakes 3+0 7.5

What is the Eutrophication?; Cultural Eutrophication; Natural Eutrophication; Sources of Nutrients; Prediction in Lake Eutrophication; Importance of Phosphorus as a Limiting Nutrient; General Effects of Eutrophication on the Aquatic Ecosystem and the Problems to Man Associated With These Effects; Community Interactions and Eutrophication; Controlling Eutrophication: Biological Control in Lakes; Chemical Control in Lake;s Mechanical Control in Lakes.

BİY647 Human Biochemistry 3+0 7.5

Constituents of Cells; Functions of These Chemicals; Proteins; Lipids; Carbohydrates; Nucleic Acids; Dissolved Materials; Membranes; Metabolism and It's Control Mechanism; Mitochondria; Bioenergetics; Thermodynamic; Electron Transport; Nucleus; Gene Expression; Plasma Membranes; Synthesis of Proteins; Surface of Cell; Transport; Specification of Cells; Jessel System; Digestion System; Nutrition; Digestion an Absorption; Function of Liver; Amino acid; Lipid and Carbohyolrate Metabolisms; Hormonal System; Immune System; Immune Response; Preservation; Sensitivity; Cell System; Illness of Immune Systems; Nervous System and It's Properties; Structure of Nerve Cells; Chemical Flow; Illness of Nervous System.

BİY648 Applied Mycology and Biotechnology 3+0 7.5

Fungi; Applied Mycology and Biotechnology; Applied Mycology and Biotechnology for Agriculture; Applied Mycology and Biotechnology for Food; Filamentous Fungi Biotechnology; Fungal solid state fermentation; Fungal enzymes; Organic acids; Secondary metabolites; Yeast Biotechnology; Strain improvement in fungi; Detection of toxigenic molds.

BİY649 Plant Genetic Resources 3+0 7.5

Biodiversity; Its Disappearances and Importance; Conservation of Ecosystems; Factors Threatening Plants; Natural Factors; Artificial Factors; Plant Gene Resources; Its Importance; In-Situ (In Natural Habitats) Conservation; Ex-Situ (Out Of Natural Habitats) Conservation; Endemic Plants; Botanical Garden; Seed Banks; Plant Reproduction Techniques; Main Principles in Plant Growth.

BİY651 Vegetation Research Methods 3+0 7.5

Floristic Methods; Braun-Blanquet Method; Calculation of Contans Degree; Finding the Differential Species; Position of Plant Associations Which Sociological Units Were Not Described; Describing the Plant Species and Charasteric Plants; Importance of Alliance; Different Sampling Methods Using for Vegetation Studies; Statistical Methods; the Concept of Ecologic Group; the Nomenclature Code of Plant Association; Counting Methods for Environmental Vegetation Researc; Mapping Natural Environment and Vegetation.

BİY652 Microbiyal Genomics 3+0 7.5

What Is The Genome and Genomics - Principles of Genomic Molecular Structure; Role of Other Related Scientific Fields Such as Proteomics and Bioinformatics; Methods And Techniques Used In Genomics; Alternative Approaches In Genome Projects; Evaluation of Results From Genome Projects; Observation and Study of Microbial Projects Already Finished Such As E. Coli O157:H7, E.Coli K-12, Deinococcus Radiodurans, Enterococcus Faecalis and Bacillus Subtilus.

BİY653 Advanced Molecular Biology 3+0 7.5

Genes: Genes are DNA, The interrupted gene, The content of the genome, Clusters and repeats; Proteins: Messenger RNA, Protein synthesis, Using the genetic code, Protein localization; Gene expression: Transcription, The operon, Regulatory circuits, Phage strategies, DNA: The replicon, DNA replication, Recombination and repair, Transposons, Retroviruses and retroposons, Rearrangement of DNA; The Nucleus: Chromosomes, Nucleosomes, Promoters and enhancers, Activating transcription, Controlling chromatin structure, RNA splicing and processing, Catalytic RNA, Immune diversity; Cells: Protein trafficking, Signal transduction., Cell cycle and growth regulation, Oncogenes and cancer, Gradients, Cascades, and signaling pathways.

BİY654 Ecological Genetics 3+0 7.5

Ecological Genetics: Why does ecological genetics work?; Markers and Sampling in Ecological Genetics: Methods of data generation, Principles of sampling, Within-population sampling, Among-population sampling, Power analysis; Genetic Diversity and Differentiation: Factors influencing diversity and differentiation, Use of genetic diversity statistics; Gene Flow and Mating System: Factors governing gene flow, The importance of biological and environmental factors on gene flow; Intraspecific Phylogenies and Phylogeography: Homology, gene trees, and species trees, Speciation and hybridization.

BİY655 Natural Antimicrobial Agents and Food 3+0 7.5

Introduction; Nisin; Bacteriocins; Natamycin; Organic Acids; Antimicrobials from Plants; Natural Antifungal Agents; New Food Additives.

BİY656 Chemotaxonomy 3+0 7.5

Importance of Taxonomy, Classification methods, Classic Taxonomic Methods, Taxonomic Characters, Biogenetic Classification of Plant Constituents, Classification Methods According to Chemical Constituents, Chemotaxonomy and Biochemical Systematics, Correlation between Chemo and Classic Taxonomy, Affinity of Chemotaxonomic Parameters with Systematics.

BİY657 Food, Human Health and Probiotics 3+0 7.5

Introduction to Prebiotics and Probiotics; Development of Probiotic Food Ingredients; Taxonomy and Biology of Probiotic; Primary Sources of Probiotic Cultures; Genetic Engineering of Probiotic Bacteria; Immunochemical Methods for Detection of Probiotics; Genetical Modified Probiotics; Use of Probiotics in Food; Probiotics as Biopreservatives for food; Probiotics in Cancer Prevention.

BİY658 Cell Regulation 3+0 7.5

Introduction; Cell Cycle and Function; Regulation of Cell Cycle and Function; Differentation Mechanisms of Cell According to Their Structure and Function; Ocuurence of Cell Types During Developmental Stage; Cell Death and Apoptosis.

BİY659 Cancer Genetics 3+0 7.5

The Genetic Bases of Cancer: Regulation of gene expression, Genetic controls of cell cycle, Tumor suppressor genes, Proto-oncogenes and oncogenes, Genes for metastasis, Genes related apoptosis; The Causes of Carcinogenesis: Epigenetic changes, The role of chromosome and gene mutations, Carcinogens, Inheritance of familial cancer; Cancer Cytogenesis; New Development and Approaches to Cancer Genetics.

BİY660 Medical Genetics 3+0 7.5

Introduction to Human Genetics; Genetic Mechanisms for Humans: Mendelian inheritance, Sex-linked inheritance, Gene linkage, Multiple allelic inheritance, Multifactor inheritance, Maternal inheritance; Chromosomal Disorders: Autosomal disorders, Gonosomal disorders; Single Gene Inheritance: Autosomal dominant and recessive gene diseases, X-linked diseases; Multifactorial Diseases; Investigation Methods of Medical Genetics: Cytogenesis and molecular analysis, Prenatal diagnosis; Genetic Counseling.

BİY661 The Molecular Basis of Cell Differentation 3+0 7.5

Definition of Cells Differentiation; Fundamental Factors in Cell Differentiation; Growth Factors and Signal Molecules: Cell membrane receptors and proliferate response, Lligand receptor relations, Fosforilation of growth factors; The Cell Differentiation in Early Embryonic Stage: The molecules involved in the Process of Development and Differentiation; Mechanism of Gene Activation in Cell Differentiation: The gene expression in differentiated cells, Constancy of the Genome in differentiated cells; Differentiation of Cancer Cells: Proto-Onkogenes functions in development and cell differentiation, Biological effects of Ontogenesis in the process of transformation.

BİY662 Basis of Molecular Evolution 3+0 7.5

What is Molecular Evolution; Structure of Gene; Mutations and theirs Types; Dynamics of Genes in Populations: Mechanism of Evolution: Natural selection, Random genetic drift, Genetic polymorphism; the Neutral Mutations and Evolution; Evolutionary Changing in Nulteotide Sequences: Indirect estimation of the number of nucleotide substitutions, Rates and patterns of nucleotide substitution, Causes of variation in substitution rates; A Case of Positive Selection; Molecular Clocks; Molecular Phylogeny; Evolution by Gene Duplication; Evolution by Transposition; Genome Organization and Evolution.

BİY663 Araneology 3+0 7.5

Taxonomy and specification of Aranea: Morphology; Anatamoy: Endoskeleton, Exoskeleton; Biology of spiders, Ecological specifications; Metabolism; Digestion systems; Circulation systems; Respiration systems; Neural systems; Spider Webs: Structure and evulation; Locomotion and prey capture; Reproduction: Female and Male reproductive organs; Development; Venomous spiders: Venoms and effects.

BİY664 Ecological Restoration 3+0 7.5

Introduction to Ecological Restoration Concept: Philosophy of Ecological restoration; Concepts and themes in ecological restoration; Effective and Sustainable Use of Natural Sources: Waste management; Usage of water; Recycling of wastes; Productivity; Rehabilitation of Ecosystems by Using Natural Sources: Environmentally friendly green technologies and their applications; Phytoremediation; Basic concepts; Advantages and disadvantages; Wetlands: Importance and characteristics of wetlands; Constructed wetlands; Usage areas of constructed wetlands.

BİY665 Advanced Biochemistry and Biochemical Techniques I 3+0 7.5

Carbohydrates; Nucleic acids and water-soluble vitamin metabolisms; The structure of water-insoluble vitamins; Lipid biosynthesis; Carbohydrate biosynthesis; Clinical enzymology; Glycolysis; Glikolisiz; Hexoses degradation; Gluconeogenesis; Citric acid cycle; Regulation of the citric acid cycle; Roxidative phosphorylation; Regulation of oxidative phosphorylation; Lipid oxidation; Urea cycle; homogenization, centrifugation, separation techniques; Electrophoresis technique; Enzyme immunoassay measurement methods; Basic principles of flow cytometry; Foundations of spectrophotometry; Absorption laws; High-performance liquid chromatography; Imaging techniques.

BİY666 Advanced Biochemistry and Biochemical Techniques II 3+0 7.5

Interaction between proteins and ligands: Immune response and specialized regulatory properties of proteins; Molecular motors; Enzyme kinetics; Allosteric effect; Kinetic tests; Bioyoenergetics and anaplerotik reactions; Glioksilat cycle; Porphyrin synthesis and degradation of hemoglobin production; Glikoconjugates; Carbohydrate analysis; DNA methylation; Fosfotidilinozoits; Eikosanoits; Synthesis of saturated fatty acids and unsaturated fatty acids; Cholesterol and other lipids are transported and degradation of purine and pyrimidine synthesis; Cholesterol; steroids and izoprenitlerin synthesis; Enzyme activities and purifying methods of measurement

BİY667 Actinomycetes in Biotechnology 3+0 7.5

Physiological Biochemical and morphological Properties of Actinomycetes; Genetic properties of Actinomycetes; Ecology of actinomycetes; Actinomycete Diversity; Isolation of Actinomycetes from Environmental Sources; Classification of

Actinomycetes; Identification of Actinomycetes; Pathogenic Actinomycetes; Actinomycete Biotechnology; Actinomycetes and Lignin Degradation; Actinomycetes and t heir Antibiotics; Actinomycetes and enzymes.

BİY668 Advanced Protein Biochemistry 3+0 7.5

Amino Acids,Peptides and Proteins:Definition and classification,Polypeptides and proteins,Protein size, Composition and properties,Determination of primary structure;Protein Structure:Structure of peptide bonds, Secondary structure,Tertiary structure,Quaternary structure; Biological Functions of Proteins:Myoglobin, Hemoglobin,Cooperative binding,Sickle-cell anemia;Protein Purification:Homogenate preparation,Centrifugation, Dialysis,Chromatography applications,Electrophoresis; Enzymes:Naming of enzymes,Kinetic properties of enzymes, Characteristics of enzyme reactions,Enzyme inhibition, Coenzymes, Allosteric enzymes,Cellular regulation of enzymes, Abzymes, Ribozymes.

BİY669 Biology of Lichenicolous Fungi 3+0 7.5

What are lichenicolous fungi? Interactions of lichenicolous fungi with lichens; Saprothropic interactions; Biotrophic and necrotrophic interactions; Gall forming lichenicolous fungi; Host specifity; The reasons for host specifity; The diversity of lichenicolous fungi; Important taxonomical characters for the identification of lichenicolous fungi; Classification of lichenicolous of fungi; Identification of lichenicolous fungi.

BİY671 Statistical Analyses in Biology 3+0 7.5

Introduction: Aim and scope, Importance and use of statistical analyses in biology, Basic concepts; Statistical Software: SPSS programme, SPSS menu, Methods of data entry into SPSS programme; Decision Making: Choosing appropriate analysis; Statistical Analyses; Descriptive Statistics; Some non-parametric tests: Chi-square test; Some Parametric tests: z and t tests, One and two way variance analyses (ANOVA), Covariance analysis (ANCOVA), Simple and multivariate linear regression and correlation analyses, Multivariate variance analysis (MANOVA), Cluster analysis, Discriminant Analysis; Interpretation of the results.

BİY672 Advanced Biochemistry and Bioenergetics 3+0 7.5

Biochemistry: Definition, Macromolecules; Enzymes: Classifications, Kinetic properties of enzyme reactions, Membranes, Membrane Transport: Chemistry of Different Reactions: Oxidation- reduction reactions, Group-transfer reactions, Hydrolysis reactions, Nonhydrolytic cleavage reactions, Isomeriation and rearrangement reactions, Bond formation reactions using energy from ATP; Concepts of Bioenergetics: Standard free energy change, Measurement of ?G??, ATP and phosphoanhydride bonds, Other reactive biomolecules for energy transfer.

BİY673 Molecular Industrial Biotechnology 3+0 7.5

Fermentation Technology; Commercial Production of Microorganism; Molecular Analysis and Amplification Techniques; Production of Gene Probes; The Expression of Foreign DNA in Bacteria; Yeast Cloning and Biotechnology; Cloning Genes in Eukaryotic Cell Lines; Biosen-sors; Protein Engineering; Vaccination and Gene Manipulation; Metagenomics in Biotechnol-ogy; Industrial Enzymes for Biopolymer Degradation.

BİY674 Molecular Microbial Ecology Techniques 3+0 7.5

Introduction to Molecular Microbial Ecology; Molecular Techniques in Microbial Ecology; Isolation of Nucleic Acids; DNA and RNA Extraction from Soil; Amplification; Polymerase Chain Reaction (PCR); Quantitative PCR of Environmental Samples; Detection of Microbial Nucleic Acids by Polymerase Chain Reaction in Aquatic Samples; Fluorescence In Situ Hybridization (FISH); Denaturing Gradient Gel Electrophoresis (DGGE); General overview.

BİY675 Microbial Biofilms 3+0 7.5

What is Biofilm?: Quorum sensing and microbial biofilms, Effect of quorum sensing on biofilm, Biofilms in disease, Tissue-related biofilm diseases, Chronic otitis media, Osteomyelitis, Biomedical implant-related infections, Oral biofilms, Ecological significance of plant-associated biofilms, Nutrient sources for biofilm formation, Biofilms in wastewater treatment systems, Biofilms in freshwater, Catalytic biofilms, Determination of biofilm formation in biofilm-forming microorganisms.

BİY676 Comparative Animal Physiology 3+0 7.5

Comparative Eco-physiology: Cellular approaches, The importance of water; Comparative Neurophysiology and Endocrinology: Nervous systems, Biological clock, Physiology of sense, Endocrine physiology; Comparative Muscle Physiology: Comparative Metabolic Physiology: Feeding and digestive physiology, Energy metabolism, Thermoregulation mechanisms; Comparative Cardio-Vascular Physiology: Vascular physiology in vertebrata and invertebrata; Comparative Urinary Systems: Water and salt physiology, Urinary physiology in invertebrata, Urinary physiology in vertebrata; Reproductive Physiology in Vertebrata and Invertebrata.

BİY677 Fungal Systematic 3+0 7.5

Introduction; History of Fungal Systematics; Categories; Nomenclature of Fungi: Naming of taxa, Some Rules of Nomenclature; Evolutionary Relationship of Fungi; Classification Systems in Fungi; Zoosporic Fungi; Chytridiomycota;

Zygomycota; Ascomycota; Basidiomycota; Deuteromycota: Blastomycetes, Coelomycetes, Hyphomycetes; Fungi-related Studies in Turkey.

BİY678 Significance of Plant Secondary Metabolites in Biotechnology 3+0 7.5

Ecological Stress Factors: Biotic factors, Abiotic factors; Molecular Response Mechanisms in Stress Conditions: Homeostasis of Macromolecules and Ions; Synthesis of Protector Molecules; Generation Mechanisms of Reactive Oxygen Species; Plant Secondary Metabolites, Duties of Secondary Metabolites; Defense against Stress Conditions: Defense against herbivores, Defense against microorganisms; Metabolic and Advanced Ecological Functions; Usage of Secondary Metabolites: Secondary metabolites used as drug substances, as nutrition ingredients, as agricultural pesticide and as cosmetic products.

BİY679 Food Mycology 3+0 7.5

Culture Media and Isolation Methods Used in Food Mycology; Fungi in Food; Heat Resistant Fungi; Identification of Foodborne Fungi; Important Mycotoxins and Fungi Producing These Mycotoxins; Control of Foodborne Fungi: Cultural methods, Molecular methods; Control of Mycotoxins in Food: Analytical methods, ELISA applications, Fast methods; Limitations Related to Foodborne Fungi; Limitations Related to Mycotoxin Contamination in Food.

BİY681 Enzyme Analyses and Activity Detection Methods 3+0 7.5

Biochemical structure of enzymes: Enzyme nomenclature, Classification; Major principles of enzymatic analyses, Defining the initial velocity, Description of enzymatic activity and its measurement in a test tube; Activity measuring conditions, Internal and external factors that influence the enzymatic activity, Calculation of enzymatic activity, Units for measurement of enzymatic activity; Methods for detection and calculation of the specific activity; Fundamentals of enzyme kinetics: Factors influencing the enzyme kinetics, Types of enzyme kinetics, Detection methods for enzyme activity and inhibition; Enzyme activity measurement and calculating kinetic analyses: Detailed evaluation of kinetic analysis samples.

BİY683 Advanced Cell Invertigation Methods 3+0 7.5

Techniques of investigation of a whole cell: Investigation with Fixation and Vital investigation, Cell cultures, Techniques used in analyses of cell components, Fractionating the cell on its Components, Homogenization Techniques; Cell Visualization Methods; Recombinant DNA Technology and Fields of Application; Classical cell applications; Hybridization methods and investigation the cell on PCR.

BİY684 (Eng) Fundamentals of Epigenetics 3+0 7.5

Mechanisms of DNA methylation in mammals; Mechanisms of histone modifications; The epigenetics of non-coding RNA; Analysis of gene-specific DNA methylation; Methods for assessing genome-wide DNA methylation; Assessing epigenetic information; Epigenetics of eukaryotic organisms: Drosophila epigenetics, Mouse models of epigenetic inheritance, Metabolic regulation of DNA methylation in mammals; Stem cells and cellular differentiation; Epigenetics of X chromosome inactivation; Aging epigenetics; The effects of diet on epigenetic processes; Cancer epigenetics.

BİY685 (Eng) Environmental Physiology of Animals 3+0 7.5

Definition of ecophysiology; Fundamental mechanisms of ecophysiology: Water, ions, and osmotic physiology, Animal water balance, Osmoregulation and excretion, Metabolism and energy supply, Respiration and circulation metabolisms, Temperature and its effects, Nervous and muscle systems, Hormones and chemical control systems; Physiological adaptations in aquatic animals; Physiological adaptations in terrestrial animals; Physiological adaptations in parasitic animals; Effects of environmental stress on animal physiology: Physiological adaptations at the molecular and genome level.

BİY692 Seminar 3+0 7.5

BİY703 Insect Physiology 3+0 7.5

Introduction: Definition of insect physiology, History of insect physiology; Integument Morphology in Insects; Nutrition Physiology in Insects; Organ Systems in Insects: Neurophysiology, Muscle physiology, Morphology of digestive system and physiology, Intermediary Metabolism, Morphology of circulation system and its physiology, Chemical Composition of Hemocyte and Hemolymph; Respiratory physiology: Structure and Function of the Tracheae: Adipose tissue in insects, Hormonal system in insects.

BİY703 (Eng) Insect Physiology 3+0 7.5

Introduction: Definition of insect physiology, History of insect physiology; Integument Morphology in Insects; Nutrition Physiology in Insects; Organ Systems in Insects: Neurophysiology, Muscle physiology, Morphology of digestive system and physiology, Intermediary Metabolism, Morphology of circulation system and its physiology, Chemical Composition of Hemocyte and Hemolymph; Respiratory physiology: Structure and Function of the Tracheae: Adipose tissue in insects, Hormonal system in insects.

BİY704 Fundamentals of Ecotoxicology 3+0 7.5

Introduction to Ecotoxicology: Historic Need, Current Need, Goals; Major Classes of Contaminants: Inorganic Contaminants, Organic Contaminants, Radiation; Factors Influencing Bioaccumulation: Chemical Features Influencing Bioavailability, Biological Features Influencing Bioaccumulation; Molecular Effects and Biomarkers: Organic Compound Detoxification, Metallothioneins, Stress Proteins, Oxidative Stress and Antioxidant Response, DNA Modification, Enzyme Dysfunction and Substrate Pool Shifts; Cells, Tissues and Organs: General Cytotoxicity and Histopathology, Gene and Chromosome Damage, Cancer, Examples.

BİY705 Insect Behavior 3+0 7.5

Insect Anatomy and Morphology; Development of Insects; Species Diversity of Insects; His-tory of Insect Behaviour; Behaviour Diversity and Its Origin; Control of Behaviour; Pro-grammed and Integrated Behaviour; Spatial Alignment; Finding Food and Nutrition; Defense; Physical Communication; Chemical Communication; Mechanical Communication; Reproduc-tive Behaviour; Parental Behaviours and Social Life.

BİY706 Advanced Bioimaging Techniques 3+0 7.5

Light and Basic Principles of Microscopy: Electromagnetic and visible spectrum, Resolution, Magnification and visaualization; Optical microscopy: Limiting factors, Bright field, Phase-contrast, Dark field and fluorescent microscopes, Recent developments in optical microscopy; Modern Fluorescent and Confocal Microscopy; Electron Microscopy (TEM, SEM); Atomic Force Microscope (AFM) and Super Resolution Microscopy (STED) Differences and Advantages; Microscopic Preparation Techniques; Microscopic Staining and Contrast Enhancement Techniques; Histochemistry and Immunohistochemistry.

BİY707 Advanced Mycology 3+0 7.5

Introduction; History of Mycology; Somatic Structure of Fungi: Hyphal structure of fungi, Special somatic structures; Lifestyles of Fungi: Fungi in bioluminescence; Number and Distribution of Fungi; Reproduction Types in Fungi: Sexual reproduction spores, Asexual reproduction spores; Sexual Availability of Fungi: Homothallic fungi, Heterothallic fungi; Relations of Fungi wıth Human: Some products derived from fungi, Mycotoxins, Toxic macrofungi; Fungiculture.

BİY708 Advantages and Disadvantages of Cell Culture 3+0 7.5

Cell Culture: Description of the cell culture, History of cell culture technology, Tissue culture; Main Types of Cell Cultures: Primary culture, Secondary cell culture; Cell Culture Laboratory Equipments: Basic equipment, Expanded equipment; Cell Culture Contamination: Some consequences of contamination, Major cell culture contaminants, Chemical contamination, Biological contamination, Cross contamination; Cell Culture Basics; Cell Lines; Media: Types of cell culture media; Advantages of Cell Cultures; Disadvantages of Cell Cultures.

BİY709 Soil Microfungi 3+0 7.5

Isolation Methods of Soil Microfungi; Isolation of Heat Resistant Microfungi; Diagnosis of Microfungi with Traditional Methods: Culture media, Preparation, Identification and use of resources; Diagnosis of Microfungi with Molecular Methods: DNA isolation, Important gene regions and Amplification of gene regions, DNA sequence analysis, Evaluation of the sequence; Aspergillus; Penicillium; Fusarium; Rhizopus; Alternaria; Cladosporium.

BİY710 Advance Molecular Genetic Methods 4+0 7.5

Methods of Nucleic Acid Labeling; DNA Isolation and Analysis Methods; RNA Isolation and Analysis Methods: Mirna Analysis Methods; Chromosome Staining and Analysis Methods; DNA Cloning Methods; Polymerase Chain Reaction (PCR) Methods; Methods of Obtaining Transgenic Organism; Genomic and Transcriptomics Study Methods: Microarray, Sequencing Methods; In Vitro Mutagenesis Method; Mutagenicity and Antimutagenicity Methods.

BİY711 Fauna of Turkey 3+0 7.5

General Presentation of Turkey's Fauna, which is Considered One of the Richest Faunas in the World; Geological and Climatic Factors That Reveal the Abundance of Turkey's Fauna; Comparing Fauna of Turkey in Different Geological Eras and at Present: Endemic animals in Turkey and distribution of the endemic animals, The species which are endangered and extinct; International and National Projects and Agreements About the Fauna of Turkey; Conservation Activities for Biodiversity in Turkey.

BİY712 Research Methods In Zoology 3+0 7.5

Description Methods to Wild Animals; Catching Methods of Vertebrata; Collection of Mammals: Types of traps, Swimming techniques and fixation, Skeleton extraction; Collection of Birds: Type of traps, Swimming techniques and fixation, Skeleton extraction; Collection of Fish, Amphibians and Reptilians; Type of Traps, Conservation Methods: Marking and monitoring methods of wild animals; Research Methods of Benthic Invertebrates: General characteristics of benthic invertebrates and sampling methods, Bentic invertebrates which are sensitive and tolerant to pollution,.and identification methods.

BİY714 Animal Ecology 3+0 7.5

Basic Principles of Animal Ecology: Ecological terms, Ecological research criteria; Ecological Factors: Abiotic factors, Biotic factors, Intraspecific factors, Sex and reproduction, Interspecific factors (Relationships between species); Principles on the Effects of Ecological Factors: Devolopment temperature and thermal constant in animals; Classification of Ecosystems: Energy in ecosystems, Energy flow, Necessary substances for animals, Substance cycle; Population and Behavioral Ecology: Factors that effect population size; Ecophysiology: General homeostatic mechanisms in animals, Thermoregulation, Osmoregulation; Conservation Biology.

BİY716 Microfungus Identification Techniques 3+0 7.5

Introduction, Isolation and investigation of foodbome microfungi, Determination and isolation of airborne microfungi, Nutrients used in identification and intended use, Microfungi Identification Methods; Morphological Identification, Molecular Identification, Chemical Identification,Definition of Common Microfungi; Aspergillusspp. Definition of Penicilliumspp. Definition of Talaromycesspp. is Described in Fusariumspp. Description of Zygomycetes Members, Alternariaspp., Cladosporium Spp. Identification.

BİY790 Thesis 0+1 30.0

BİY890 Thesis 0+1 30.0

BİY890-0 Thesis (Thesis Proposal) 0+1 30.0

CAM513 Metallic Glasses 3+0 7.5

Introduction; The Types of Metallic Glass Alloys, Structure of Metallic Glasses, Formation Theories of Metallic Glasses, Investigations on Behaviour and Properties of Non Crystalline Phases, Theoretical Mechanism of Deformation and Fracture, Effects of Crystallisation on the Mechanical Properties, General Application Fields of High Temperature Metallic Glasses.

CAM514 Chemical Durability of Glasses 3+0 7.5

Definition and Importance of Chemical Durability; Chemical Endurance in Certain Corrosive Environments; Behaviour of Several Glass Systems in Different Environments; Factors Affecting Chemical Durability; Measuring Methods of Chemical Durability and Standard Tests; Improvement Method of Chemical Endurance; Highly Durable Commercial Glass Systems and Their Applications.

CAM515 Engineering Glasses 3+0 7.5

Commercial Glass Systems; Soda-Lime-Silica Glasses; Borosilicate Glasses; Phosphate Based Glasses; Germanate Glasses; Chalgogenide Glasses; Metallic Glasses; Organic Glasses; Industrial Raw Materials Used in Glass Production and Their Properties; Glass Production; Certain Physical, Chemical, Mechanical and Optical Properties of Glasses; Glass Characterization Techniques; Technologically Important Glasses; Crystallization in Glass, Glass Ceramics and Their Applications

CAM601 Ionic Diffusion in Oxide Based Glasses 3+0 7.5

Structure of Oxide Glasses; Investigation Methods for Glass Structure; Results of Experimental Studies; Diffusion Mechanisms in Glass; Chemical Diffusion; Impurity Diffusion; Activation Energy and Frequency Factor; Correlations Between Causes and Results.

CAM602 Glass Science and Technological Improvements 3+0 7.5

Introduction; Lacks of Present Glass Systems and the Efforts on Their Eliminations; Latest Developments in the World of Technical Glasses; Interdisciplinary Relationships of Glasses with Other Materials and the Effects of Such an Interaction on Final Products; New Glass Production Processes; Precautions to be Taken for Cost Reduction; Relations Between Technology and Design; New Properties of Final Products and Their Characterisation; Environmental Consciousness and its Effect on the Production.

ÇEV501 Special Topics in Environmental Engineering I 3+0 7.5

Current Subjects and Nationwide and Local Problems Will Be Covered in this Course.

ÇEV507 Biomoleculer Techniques in Water Treatment 3+0 7.5

Problems imposed by microorganisms in water treatment systems; Adventages and disadventages of molecular techniques for microbiota analysis; FAME, PCR, 16S / 18S rRNA sequencing; phylogenetic analysis and the ecological process relation between phylogenetic information and microbiota; Profiling complicated microbial populations using DGGE, TTGE, SSCP, RAPD, ADRA, T-RFLP, LH-PCR and RISA; nucleic acid probes; counting, identification and monitoring of pollutant-degrading bacteria using FISH, MAR and SIP; Environmental engineering applications of omic technologies and post-genomic approaches.

ÇEV508 Microplastic Pollutants 3+0 7.5

The Emergence of Plastics; The Contemporary History of Plastics; Plastic Production, Waste and Legislation; Physicochemical Properties and Degradation; Microplastics, Standardization and Spatial Distribution; The Interactions of Microplastics and Chemical Pollutants; The Biological Effects of Contaminated Microplastics; Microplastic Collection Tecniques; Microplastic Separation Techniques; Microplastic Identification Techniques; Recent Studies on Microplastics; National R&D Capacity on Microplastics.

ÇEV510 Sustainable Waste Management and Circular Economy 3+0 7.5

Sustainability: Sustainable development goals, Responsible production and consumption; Principles of Sustainable Waste Management: Source reduction, Reuse, Recycling, upcycling, Recovery, Environmental, Social and economic evaluation; Circular Economy and Circular Value Chain: Transition from linear to circular economy, Sustainable resource management, Efficient resource conservation and product design throughout the entire value chain; Innovation Areas: Renewable energy integration, Carbon dioxide capture technologies, Energy and resource efficiency, Circularity of materials, İndustrial-urban symbiosis, Digitalization, Etc.

ÇEV517 Modeling of Air Pollution 3+0 7.5

Atmospheric Physics and Atmospheric Chemistry; Air Pollution and Meteorological Events; Air Pollution Models; Mathematical Modeling; Meteorological Modeling; Eularian Dispersion Models; Gaussian Models; Lagrangian Dispersion Models; Statistical Models; Utilization of Computer Software Related to Modeling and Case Problem Solutions.

ÇEV523 Instrumental Analysis and Evaluation Methods in Environmental Engineering 3+0 7.5

Terminology of Instrumental Analysis in Environmental Engineering; Unit Conversions and Computations; Basic Principles; Theory of the Working Principles of Basic and Frequently Used Instruments; Preparations Before Use: Sample preparation, Calibration, Working Data etc.; Post-assessment; Choosing the Best Analysis Method; Use of the Present Instruments and Practical Considerations.

ÇEV524 Ecotoxicological Risks of Pollutants 3+0 7.5

General Information About Ecotoxicology; Sources of the Pollutants Qualified as Toxic; Influence Mechanisms and the Ways of Take Into and Discharge From the Body; Determination of the Toxicity and Dose-Response Relations; Suggesting Threshold Values; Examples of Investigation on Ecotoxicology; Bioaccumulation and Bi magnification.

ÇEV525 Biomonitoring and Techniques in Monitoring Environmental Quality 3+0 7.5

General Descriptions of Factors that Affect Environmental Quality; Importance of Biomonitoring; Suitable Organisms and Their Features; Methods of Biomonitoring; Comparison of the Reliabilities of Biomonitoring Studies with Other Analysis; Case Studies on Biomonitoring.

ÇEV526 Integrated Waste Management Economics 3+0 7.5

The Selection and Application of Suitable Techniques; Technologies and Management Programs to Achieve Specific Waste Management Objectives; Cost-Benefit Analysis on the Selection of Some Disposal Alternatives; Life Cycle Inventory; Basic Environmental Effects on Sanitary Landfilling and Incineration and Their Economic Evaluation.

ÇEV527 Advanced Solid Waste Management I 3+0 7.5

Integrated Solid Waste Management: Solid Waste Generation, Separation at the Source and Storage, Solid Waste Collection Systems, Analysis of Collection Systems, Unit Operations Used for the Separation and Processing of Solid Wastes; Transfer and Transport of Solid Wastes: Types of Transfer Stations; Recycling Processes; Recycling / Recovery Systems; Biological and Chemical Conversion Technologies: Aerobic and Anaerobic Composting Processes and Technologies, Energy Recovery of Biological Conversion Processes.

ÇEV528 Industrial Air Pollutionand Control 3+0 7.5

Planning Industrial Air Pollution Survey; Sources, Inventories, Emission Factors Field Sampling for Various Industrial Pollutants; Air Quality Monitoring Studies for Industrial Areas; Various Strategies Related to Industrial Pollution Control; Air Pollution Control at Combustion and Non-Combustion Emission Sources; Control of Fugitive Emissions; Control Technologies for Pollutants at Gaseous and Vapor Phase and Control Equipment Design; Control Technologies for Particulate Pollutants and Dust Collector Design; Control Costs; Economic Analysis.

ÇEV530 Anaerobic Biotechnology for the Treatment of Wastes 3+0 7.5

Basic Principles of Anaerobic Biotechnology; Advantages and Disadvantages of Anaerobic Biotechnology over Aerobic Biotechnology; Basic Process Microbiology; Kinetics and Stoichiometry of Anaerobic Reactions; Protocol of Anaerobic Treatability; Management Concepts; Basics of Process Design; Alkalinity; Nutrition and Trace Element Requirement; Toxicity and Microbiological Adaptation; Energy Production in Anaerobic Systems; Examples of Anaerobic Treatment of Industrial; Agricultural; Solid and Hazardous Wastes.

ÇEV531 Statistical Analysis of Engineering Data 3+0 7.5

Basic Statistical Concepts; Regression and Correlation Analysis; Analysis of Variance; Identification of the Method for Experimental Studies; Reduction of Experimental Errors During Experimental Data Collection; Determination of the Relations Between Parameters that Affect Experimental Results; Analysis in Experimental Design; t, f and '2 . Tests; Establishing Mathematical Models; Testing of Hypothesis Related to Mathematical Modeling and Related Rules of Decision; Factorial Design and Applications Related to Engineering Topics; Computer Aided Data Analysis Systems and Data Evaluation; Utilization of Software in Data Analysis.

ÇEV533 Nonpoint Source Pollution 3+0 7.5

Point and Nonpoint Sources in Water Pollution: Definition of the nonpoint source pollution; Its characterization; Sources and Causes; Transport Routes of Pollutants from Diffuse Sources; Hydrological Aspects of Nonpoint Source Pollution; Erosion and Soil Loss; Nonpoint Source Pollution Management; Watershed Management; Pollution Control; Best Management Practices; Modeling of Nonpoint Source Pollution; Model Classification; Characteristics of the Models Used in Nonpoint Source Pollution Modeling and Their Comparison.

ÇEV535 Groundwater Pollution and Treatment 3+0 7.5

Formation of Groundwater; Introduction to Groundwater Geochemistry: Solution Equilibrium; Carbonate Chemistry; Weathering; Redox Processes; Origins and Scenarios of Groundwater Contamination; Pollutant Transport: Retardation of the Chemicals; Dispersion and Diffusion; Flushing and Aquifer Clean-Up; Physical/Chemical Interactions of Pollutants With Soil Matrix and Water; In-Situ and Ex-Situ Treatment Technologies.

ÇEV536 Natural Treatment Systems 3+0 7.5

Definition, Aim and Characteristics of Natural Treatment Systems; Types of Natural Treatment Systems; Wetlands: Natural Wetlands; Wetlands in Turkey and their Environmental Potentials; Constructed Wetlands; Surface Flow Systems; Subsurface Flow Systems; Aquatic Plants and Plant Selection; Fundamental Considerations in the Application of Natural Treatment Systems; Wastewater Characteristics; Treatment Mechanisms Applied; Public Health; Slow-Rate and Rapid Infiltration Systems; Design Principles of Natural Treatment Systems; Case Studies.

ÇEV539 Life Cycle Assessment 3+0 7.5

Life Cycle Assessment (LCA): Concept and history; LCA Methodology: Goal and scope, Definiton, Inventory analysis, Impact assessment; LCA and ISO 14000 Relation; Life Cycle Analysis Softwares and Applications.

ÇEV540 Modelling of Environmental Systems 3+0 7.5

Modeling and General Principles; Characteristics of Natural Systems with Respect to Modeling; Modeling of Well-Mixed One-dimensional Systems; Advection and Dispersion; Modeling of One-dimensional Streams; Modeling of Two-dimensional Systems like Lakes and Oceans; Numerical Solutions; Presentation of the QUAL2E Model and Applications.

ÇEV541 Water Treatment Technologies and Applications 3+0 7.5

Selection of Process for Water Treatment; Factors influencing the choice, Evaluating process options, Examples of treatment process; Filter Media; Filter Bed and Materials; Flow Through Porous Media; Rapid/Slow Sand Filters; Specifications and Operations; Ion-exchange and Adsorobtion; Theory, Materials and Reactions, Adsorption Kinetics, Columns, Regeneration; Adsorption of Organic Compounds; GAC/PAC Adsorption Systems; Membrane Filters and Design; Chemical Oxidation; Use of Oxidants for Water Treatment and Applications.

ÇEV542 Nitrogen and Phosphorus Removal from Municipal Wastewater 3+0 7.5

Nitrogen Removal: Source of nitrogen in wastewater, Principles of nitrification and denitrification and options, Combined nitrification/denitrification systems; Physical/chemical nitrogen removal processes: Breakpoint chlorination, Air stripping of ammonia, Selective ion exchange; Phosphorus removal: Sources of phosphorus in wastewater, Principles of chemical phosphorus removal and options, Principles of biological phosphorus removal mechanisms; Affecting Factors and Systems.

ÇEV543 Accreditation Process of Test Laboratories 3+0 7.5

General Definitions in Accreditation Process; Fundamentals of TS EN ISO/IEC 17025: Short history of accreditation, Developments of accreditation, Comparison with ISO 9001-2000; Advantages of Accreditation; Scope of TS EN ISO/IEC 17025: Main scope, Reference standards and documents, Terms and definitions, Management conditions, Technical conditions; Accreditation Practices: Preparation of documents, Preparation of standard operation procedure (SOP), Uncertainties.

ÇEV544 Metal Pollution and Environment 3+0 7.5

Introduction to Metal Pollution: General evaluation of metal pollution, Definitions and topics; Metal Pollution in Water: Aquatic ecosystems, Toxic materials, Metal concentration in river, lake and ocean waters, Heavy metals in aquatic organisms; Metal Pollution in Soil and Sediment: Sources, Reasons, Accumulation, Pollution results; Metal Existence in Air: Causes and solutions, Cycle of elements; Relationship between metals and microorganisms: Metal extraction.

ÇEV545 Advanced Microbial Ecology 3+0 7.5

Introduction to Microbial Ecology: Microbial variety and definitions, Microorganism nutrition; Factors affecting microorganisms: Physical, Chemical, Biological Factors; Types of Microorganism Surroundings: Terrestrial and aquatic environments; Microbial Interaction: Competition, Succession, Antimicrobial materials; Microorganism Relations: Symbiotic relation, Interrelations between microorganisms, Other cooperations; Biogeochemical Cycles: Chemical element, Soil and petroleum formation; Pathogenic Organisms: Bacterial, viral, fungal diseases; Pollution Microbiology: Toxins, Aerosols, Metals, Radiation.

ÇEV546 Advanced Treatment Techniques 3+0 7.5

Electrochemical Engineering and Applications; Electrochemical Technologies and Water Pollution; Electrochemical Technologies and Air Pollution; Electrochemical Reactors and Electrodes Used in Pollution Control; Transfer Processes in Electrochemical Reactors; Performance Criteria for Electrochemical Reactors; Cost of Electrochemical Processes; Removal of Organic Compounds by Electrochemical Methods; Removal and Recovery of Metals; Removal of Inorganic Compounds; Sterilization of Water and Wastes; Electrochemical Applications for Nuclear Wastes; Removal of Gaseous Pollutants and Electrochemical Methods for their Conversion to Useful Products.

ÇEV547 Special Waste Management 3+0 7.5

Terminology and Definitions; Principles of Waste Management; Electrical and Electronic Waste Management; Healthcare Waste Management; Waste Oil Management; Waste Vegetable Oil Management; Waste Batteries and Accumulators Management; Waste Tire Management; Excavation Soil, Construction and Demolition Waste Management; Nuclear Waste Management; Planning of Special Waste Programs: Using different decision making techniques; Case Studies.

ÇEV549 Advanced Techniques in Hazardous Waste Management 3+0 7.5

Principles of Hazardous Waste Management: General definitions, National and international legislations, Characterization and Monitoring of Contaminated Sites with Hazardous Wastes; Risk Management; Advanced Treatment and Disposal Methods: Soil vapor extraction, Distillation, Solvent extraction, Supercritical fluid extraction, Biological methods, Phytoremediation, Stabilization and solidification, Thermal methods; Case Study related to Hazardous Waste Treatment.

ÇEV551 Industrial Processes and Pollution Prevention 3+0 7.5

Pollution Control and Prevention Techniques in Industrial Processes: Pollution prevention and waste minimization concepts, Terminology, National and international legislation; Waste Minimization and Resource Conservation Based on Cleaner Production: Pollution prevention strategies, Physical, chemical, biological and thermal techniques; Life Cycle Assessment; Industrial Symbiosis: Industrial symbiosis concept and best available technologies, Eco-efficiency in industrial processes, Eco-industrial parks strategies; Case Studies on Pollution Prevention Techniques.

ÇEV552 Contaminated Site Remediation 3+0 7.5

Definition of contaminated sites, properties of pollutants; field characterization and monitoring; soil and groundwater remediation technologies, design, operation and performance evaluation of remediation systems at the site; remedial target and risk assessment; evaluation of remedial alternatives, cost analysis; case studies in site improvement systems.

ÇEV553 Green Building Certification Programs and Applications 3+0 7.5

Green Buildings: Basic concepts, History of green buildings; Green Building Certification Programs: Energy Star, BREEAM, LEED; LEED Certification Program: Structure of the program; Certification Rating Systems; Investigation of LEED Certified Buildings; Cost of Green Buildings; LEED for New Construction; LEED for Existing Buildings; Green Building Application for New or Existing Buildings.

ÇEV555 Different Decision Making Techniques in Environmental Management 3+0 7.5

Decision Making Problems: Decision components, Basic concepts and definitions; Multi-Criteria Decision Making: MCDM components, MCDM problem types, MCDM methodology; Evaluation Methods for MCDM Problems; Analytical Hierarchy Process; Analytical Network Process; ELECTRE Method; PROMETHEE Method; Linear and Nonlinear Programming; Application of Different Decision Making Methods; Software on Waste Management and Energy Management.

ÇEV557 Scientific Research Processes 3+0 7.5

Scientific Concepts; Student-Advisor Communication; Building Research Questions/Hypothesis and Development; Information Needs and Sources; Approaches for Precision Searching; Academic Database ve Fair Use; Thinking Critically About Information Sources; Ethical Use of Sources and Plagiarism - Applications on Turnitin or Ithenticate Programs; Time Management in Research Processes; Scientific Activities and Products: Congress, Symposium, Workshop, Project, Article, Poster, Presentation; Different Applications in Data Processing-Sigmaplot; Different Applications in Presenting Results-Prezi; Different Applications in the Processing of Bibliography-Endnote.

ÇEV559 Environmental Biogeochemistry 3+0 7.5

Basic Concepts of Biogeochemistry: Beginning of life, Formation of soil, Chemical structure of water resources; Environmental Biogeochemistry: Biogeochemical Processes in Terrestrial and Aquatic Ecosystems, Interaction between seasonal and regional variations of biogeochemical cycles, Interactions with anthropogenic environmental perturbations and biological biogeochemical cycles, Effects of natural processes and perturbations on the behavior and bioavailability of pollutants; The role of biogeochemistry in environmental management concepts and tools: Ecosystem services, Environmental matrices, Biogeochemistry in EU Directives and Turkish environmental legislation.

ÇEV561 Small Scale Drinking and Potable Water Treatment 3+0 7.5

Introduction to Small-Scale Drinking and Potable Water Treatment Systems; Quality of Drinking and Potable Water: Drinking water standards; Drinking and Potable Water Treatment Processes and Processes; Membrane Processes: Ultrafiltration, Nanofiltration, Reverse osmosis; Electrodialysis; Adsorption; Ion Exchange; Evoporation; Condensation; Advanced Oxidation: Hydroxyl radicals, Ozone, UV, Cavitation, Photocatalytic oxidation.

ÇEV592 Seminar 3+0 7.5

ÇEV601 Special Topics in Environmental Engineering II 3+0 7.5

Current Subjects and Nationwide and Local Problems Will Be Covered in This Course.

ÇEV604 Environmental Organic Chemistry 3+0 7.5

Basic Concepts of Organic Chemistry; Classification of Chemicals; Solid / Liquid / Gas Phase Equilibrium Partitioning: Molecular interaction and thermodynamics, Vapor pressure, Activity and solubility, Partitioning between air / water and organic solvent, Organic liquid-water partitioning, Organic acids and bases, Sorption processes; Transformation Processes: Abiotic Processes, Hydrolysis, Redox, Photochemical; Biotic Transformation Processes; Transport Processes: Advection, Diffusion; Receptor Modeling; Recent Studies on Synthetic Organic Pollutants.

ÇEV609 Engineering for Sustainable Environment 3+0 7.5

Emerging Global Challenges; Sustainability; Sustainable Environment; Sustainable Engineering; Sustainability Indicators, Metrics and Assessment Tools; Industrial Sustainability; Energy and Material Flow Analysis; Carbon Trading and Offsetting; Carbon Management and Reduction Solutions; Sustainable Engineering Practices; Sustainable Environmental Management Systems and Technologies; Sustainability Literacy; Current Studies in Engineering Disciplines.

ÇEV610 Industrial Environmental Quality Management 3+0 7.5

Management of Air and Water Quality; Solid Wastes; Hazardous and Toxic Wastes at Industrial Facilities; Industrial Hygiene and Risk Management; Quality of Work Environment at Industrial Facilities and its Effect on the Health of Workers; Worker Health-Worker Safety Procedures; Environmental Impact Assessment (EIA) Studies; Environmental Quality Management Systems (EQMS) - ISO 14000 Applications; Legislation and Standards Related to Conservation of

Environmental Quality; Quality Monitoring and Evaluation Studies; Procedures Applied in Impact Assessment and Regulation; Studies Toward Conservation and Improvement of Environmental Quality.

ÇEV611 Risk Assessment for Environmental Health 3+0 7.5

Introduction to Risk Assessment: Risk, Defining environmental risks; Elements of Risk Assessment: Hazard assessment, Dose-response assessment, Exposure assessment, Exposure routes, Ways of exposure, Risk characterization; Contaminant-specific Conditions: Risk assessment for carcinogens, Risk assessment for noncarcinogens; Limitations of Risk Assessments: Sources of uncertainties, Dealing with uncertainties; Risk Communication; Case Studies in Environmental Health Risk Assessment.

ÇEV612 Transfer Mechanisms of Incineration Processes 3+0 7.5

Design and Engineering Principles of Incineration Processes; Destruction and Removal Efficiency; Excess Air, Temperature and Turbulence Effects on Flow Regime; Steady-State Mass and Heat Transfer; Combustion and Chemical Kinetics.

ÇEV614 Advanced Solid Waste Management II 3+0 7.5

Thermal Conversion Technologies: Fundamentals of Thermal Processing, Combustion Systems, Pyrolysis Systems, Gasification Systems; Environmental Control Systems; Air Pollution Control, Water Pollution Control, Ash Disposal; Energy Recovery Systems; Sanitary Landfills: Landfill Siting Considerations, Landfill Design, Control of Leachate, Energy Recovery Processes of Landfill Gas; Restoration and Rehabilitation of Landfills.

ÇEV616 Advanced Disinfection Techniques 3+0 7.5

Investigation of Disinfection and Sterilization in the Labarotary; Various Methods: Ilitation; Interilization; Sterilization; Tyndalization; Sterilization With Chemical Addition; General Disinfection And Affecting Factors; Type of Disinfectant; Type of Microorganism; Disinfection Duration; Ultraviolet Radiation; Fluorine; Chlorine; Hypochlorite; Alcohols; Techniques Based on Photoactivation; Electrochemical Disinfection; Disinfection With Electrooxidation; Bacteria Removal by Electroadsorption; Disinfection With Electrocoagulation; Disinfection With Ultrasound.

ÇEV617 Thermal Conversion Technologies 3+0 7.5

Fundamentals of Thermal Processing: Stoichiometric Combustion, Excess Air Combustion, Heat released from combustion; Materials and Heat Balance for the Combustion of Solid Waste; Combustion Systems: Types of combustion systems; Heat Recovery Systems; Pyrolysis Systems; Gasification Systems: Description of the gasification process, Gasifier Types; Environmental Control Systems; Energy Recovery Systems: Flow diagrams.

ÇEV619 Environment Quality Development Plans 3+0 7.5

Pollution Prevention Concept; Properties and Fates of Environmental Contaminants: Organic chemicals, Metals, Contaminant transport and transformation processes; Industrial Activities and Environment: Air pollution, Solid wastes, Hazardous wastes, Water pollution, Energy usage; Resource depletion; Improved Manufacturing Operations: Process development and design; Pollution Prevention Economics: Organizing the program, Preliminary assessments, Plan development; Reclamation Technologies: Environmental Management Systems; Environmental Audit Mechanisms.

ÇEV620 Transport and Fate of Pollutants in Water Systems 3+0 7.5

Fundamentals of Pollutant Transport in Water Systems (Streams, Lakes, Marine Environment); One-dimensional and Two-dimensional Transport; Continuity and Momentum Equations; Diffusion and Dispersion of Pollutants; Analytical and Numerical Solutions; Behavior of Pollutants in Water Systems; Conservative and Nonconservative Behavior; Degradation Reactions (Hydrolysis, Photolysis, Biodegradation); Other Mechanisms (Volatilization, Settling).

ÇEV621 Advanced Techniques for Atmospherıc Analyses 3+0 7.5

Atmospheric pollutants, organic and inorganic pollutants present in liquid, solid and gaseous phases in the atmosphere. Pre-treatment procedures for the atmospheric samples and advanced techniques applied for the extraction of samples. Analytical techniques such as GC, GC-MS, LC, LC-MS for the determination of organic pollutants and their working principles, calibrations; Analytical techniques such as UV-VIS, AAS, GFAAS, ICP, ICP-MS for the determination of inorganic pollutants and their working principles, calibrations; Qualitative and quantitative İNŞtrumental analysis; standard reference materials, accuracy and precision calculations in quality control analysis.

ÇEV623 Global Warming Parameters and Control Techniques 3+0 7.5

Cause-Effect Relations for Global Warming/Cooling and Different Views; Historical Earth-Temperature Profile; Greenhouse Effect and the Greenhouse Agents; Global Climate Systems; Natural Radiative Energy Interactions; Earth Energy Balance; Equivalent Carbon Dioxide Concentration and Earth Carbon Balance; Deforestation Issues; Relationships between Population and Economic Growth, Global Energy, Temperature and Carbon Cycle, and the Related Models; New Technology Designs and Principals for Controlling Global Temperature Changes; International Economic Allocation Models such as Carbon Tax, etc. for the Contributers of Global Warming Agents; Forecasting Capabilities of the Models and Evaluation of Scenario-Based Data for the Future; International Protocols.

ÇEV624 Atmospheric Chemistry 3+0 7.5

Introduction: Description of atmosphere, Composition of air, Solar radiation, Importance of atmospheric reactions; Atmospheric trace compounds: sulfur-containing compounds, nitrogen-containing compounds, halogen-containing compounds; Atmospheric ozone; particulate matter: Stratospheric aerosols, tropospheric aerosols, carbonaceous particulates, mineral dust; Overview of stratospheric chemistry: Chapman reactions, nitrogen oxide cycle, ozone; Overview of tropospheric chemistry: Photochemical cycles of NO2, NO and Ozone, Chemistry of methane, Tropospheric ozone budget, Chemistry of nonmethane organic compounds, chemistry of biogenic hydrocarbons; Acid rain: Formation and fate of inorganic and organic acids in the troposphere.

ÇEV625 Integrated Natural Resource Management 3+0 7.5

Description of Natural Resource; Fading and Inexhaustible Natural Resources; Importance of Natural Resource; Concept of Management; Biotic and Abiotic Resources Management; Sus-tainable Living; Sustainable Ecosystems; Threat Factors for Natural Resource; Integrated Nat-ural Resource Management Principles and Tools; Variable-Sized Analysis and Methods; Re-source Management Practices in Different Areas.

ÇEV626 Nanotechnology Applications in Water and Wastewater Treatment 3+0 7.5

Relation Between Nano Materials and Water and Wastewater treatment; Present and Prospective Applications of Nanotechnology in Water and Wastewater Treatment; Adsorption Applications in Drinking and Wastewater in Nanotechnology; Nanotechnological Membrane Preparation and Their Application Processes in Water and Wastewater Treatment; Nanotechnology Applications in Water and Wastewater Treatment for Disinfection; Nanosensors in Water and Wastewater Treatment.

ÇEV627 Environmental Biotechnology 3+0 7.5

Introduction to Environmental Biotechnology: General definitions and notions; Chemical Mi-crobiology: Chemical components and function of cell, General biochemical reaction mecha-nisms; Biokinetics: Reaction kinetics and biokinetic levels; Treatment Microbiology: Biological treatment processes; Bioreactors; Nutrient Removal: Nitrogen removal, Phosphorus removal; Production of Biofuel: Bioethanol production, Biogas production; Bioremediation; Current literature surveys about environmental biotechnology

ÇEV629 Biodiversity and Protected 3+0 7.5

Description of Biodiversity: Genetic diversity, Species diversity, Ecosystem diversity, Pro-cessing diversity; Importance of Biodiversity; Loss of Biodiversity; Protection of Biodiversi-ty: Protection efforts and methods, National and international responsibilities, Protected areas, Conventions; Threat to Biodiversity; Turkey's Biodiversity; Methods for Sustainable Use for Biological Resources.

ÇEV631 Electrochemical Water and Wastewater Treatment 3+0 7.5

Basic Concepts in Electrochemistry; Electrocoagulation: reactions, electrode materials, electro-Fenton methods, applications in water and wastewater treatment, an experiment in the lab.; Electrochemical oxidation(EO): indirect EO, direct EO, electrode materials, electrochemical oxidation of organic compounds, electrochemical oxidation of inorganic compounds, electrochemical disinfection, applications in water and wastewater treatments, an experiment in the lab.; Electrochemical Reduction: electrochemical reduction of metals, electrochemical reduction of inorganic and organic nitrogen compounds; Electroflotation: principles; Electrodialysis: principles, main calculat.

ÇEV633 Biological Treatment Of Industrial Wastes 3+0 7.5

Industrial Wastes Definition and Types of Industrial Wastes; Existing Pollutants in Industrial Wastes: Heavy metals, Pesticides, Polycyclic aromatic hydrocarbons, Chlorinated hydrocarbons, Petroleum hydrocarbons, Detergents, Antibiotics, Dyes, Oils, Xenobiotic compounds, Polymers, Explosives; Biological Treatment Definition and Types of Biological Treatment; Biological Treatment Strategies: In-situ biological treatment, Ex-situ biological treatment; Biological Treatment Application Methods: Bacterial biological treatment, Mycoremediation, Phytoremediation, Nanobiotechnology, Biosensors.

ÇEV692 Seminar 3+0 7.5

ÇEV790 Thesis 0+1 30.0

ÇEV890 Thesis 0+1 30.0

ÇEV890-0 Thesis (Thesis Proposal) 0+1 30.0

ÇYÖ501 Domestic Wastewater Management 3+0 7.5
Domestic Wastewater Management: Centralized / Decentralized Wastewater Management; Wastewater Quantity and Ccharacteristics: Wastewater flow characteristics, Calculation of flowrates, Wastewater characteristics, Grey water; Decentralized Wastewater Management Systems: Cesspool, Septic tank, Imhoff tank, Sand filters; Decentralized Wastewater Management Systems: Screens, Grit chamber, Settling tanks, Activated sludge, Disinfection.

ÇYÖ502 Hazardous Waste Engineering and Management by Decision Making 3+0 7.5
Definition of Hazardous Waste Engineering and Management; Legal Status Related to Hazardous Wastes; Classification and Characterization of Hazardous Wastes; Hazardous Waste Transport Mechanism; Risk Analysis of Contaminated Sites with Hazardous Wastes; Pollution Prevention and Waste Minimization Approach in Hazardous Wastes; Transportation of Hazardous Wastes; Physical, Chemical and Biological Treatment Methods; Thermal Methods; Construction, Operation and Closure of Hazardous Waste Landfills; Healthcare Medical Waste Management and Case Study; Multi Criteria Decision Making; Benefit/Opportunity/Cost/Risk Analysis; Planning of Hazardous Waste Management by Decision Making Techniques.

ÇYÖ503 Legislation on Environmental Issues I 3+0 7.5
Environmental Legislation and its Purpose; Water Pollution Control Directive:, Announcement ofNotification for Administrative Procedures, Announcement of Notification for Sampling and Analysis Methods, Municipal Wastewater Treatment Directive, Announcement ofNotification for Sensitive and Less Sensitive Water Aareas, Announcement Notification for of Wastewater Treatment Plans Technical Procedures for Wastewater Treatment Plants, Quality Directive of Swimming Pool Water, AnnouncementsNotifications and Circulars Rrelated to Aall Ssubjected Ddirectives, Notices and dData Fflow Rrelated to lRegulationsegal devising.

ÇYÖ504 Legislation on Environmental Issues II 3+0 7.5
Legislation on Wastes; Regulation on the Waste Management Directive; Regulation Directive on the Control of Packaging Wastes; Regulation Directive on the Waste Incineration; Regulation Directive on Landfills; Directive on the Control of Waste Electric and Electronic Devices; RegulationDirective on the Control of Batteries and Accumulators Control; Regulation Directive on the Control of Waste Oil and Waste Vegetable Oil; Regulation Directive on the End-of-Life Tires; Regulation Directive on the Control of PCB and PCT Wastes; Regulation Directive on the Control of Healthcare Medica Wastes; All Notifications and Circulars are related byRelated to These RegulationsDirectives; Licensing Procedures for Waste Management; Data Processing on the Legislation.

ÇYÖ505 Bioenergy Production 3+0 7.5
Overview of Bioenergy GenerationProduction: Definition, Principles and limitations; Process Microbiology: Environmental factors; Kinetics and Modeling: Basic elements, Modeling of energy generationproduction; Anaerobic Reactor Configurations for Bioenergy Production: Classification of anaerobic bioreactors; Molecular Techniques: Fundamentals of molecular techniques; Bioenergy Recovery from Sulfate-Rich Waste Streams: Sulfate-reducing bacteria; Bioenergy Generation Production from Residues of Biofuel Industries; Biohydrogen Production: Biological hydrogen production, Dark fermentation; Microbial Fuel Cell: Evaluation of MFC performance and design; Biogas Processing: Biogas production.

ÇYÖ506 Quality Management System Approach in Testing Laboratories 3+0 7.5
Concept of Quality Concepts: Total quality management, Standard and standardization; TS EN ISO/IEC 17025 Standard: History, Benefits; Concept of Accreditation Concept: Accreditation steps, International scale; Accreditation System Setup for aA Laboratory: Scope, Reference to standards, Terms and descriptions; Management Requirements: Points to consider in management requirements; Technical Requirements: Points to consider in technical requirements; Internal and External Quality Control: Audits, Quality control cards, Conformity tests.

ÇYÖ507 Industrial Wastewater Control 3+0 7.5
Selection of Treatment Process: Analysis of production process, Waste characterization, Determination of candidate technologies, Economic analysis; Industrial Wastewater Properties: Priority pollutants, Metals, Colours, Phosphorus-containing compounds, Nitrogen-containing compounds, Other pollutants, Pollution Prevention: General approach, Benefits of preventing pollution, Reducing pollution, Pollution prevention benefits, Recycling, Re-use, Industrial wastewater treatment methods: Equalization, Chemical methods, Biological Methods.

ÇYÖ508 Drinking Water Qality and Control 3+0 7.5
Quality of Drinking Water:, Drinking water standards;, Problems Rrelated with to Wwater Ssources and Ssuggested solutions:, Water sources, Selection of water sources and classification, Diseases can that can be transmitted infected with wwater;, Unit Basic Operations aAnd Processes Applied İln Water Treatment:, Aeration, Rapid mixing-slow mixing,

Sedimentation, Softening, and Ffiltration systems, Disinfection;, Problems Rrelated with Wwater Ddistribution Networksystem and Plpumbping Ssystem.

ÇYÖ510 Determining the Environmental Performance of Products and Processes 3+0 7.5

Environmental Performance Determination Methods: Eco-labels, Environmental Product Declarations (EPD), Life Cycle Assessment (LCA), Life Cyle Cost Analysis (LCC); LCA Concept and Methodology: Definitions of gGoal and scope definition, Inventory analysis, Impact assessment, Interpretation; LCA Software Tools: Sample LCA studiesy; Criteria Used for Determining the Environmental Performance of Products; Global Warming, Ozone depletion, Photochemical ozone formation, Acidification, Eutraphication, Ecotoxicity, Human toxicity.

ÇYÖ512 Indoor Air Quality Measurement 3+0 7.5

Importance Factors of Indoor Air Quality; Indoor Air Pollutants and tTheir Sources; Comfort Parameters Affecting Indoor Air Quality and Their Relations with tThe Pollutants; Indoor Air Quality Measurement and Sampling Methods: Equipments and techniques for measurement and sampling studies, Extraction and analysis methods after sampling; Effects of Poor Air Quality and Sick Building Syndrome.

ÇYÖ514 Urban Air Quality Management 3+0 7.5

Factors Effecting Air Quality in Urban Settlements; Components of an Air Quality Management System; Clean Air Action Plans (CAAP): Turkish legislation on preparation of CAAPS, Developing an action plan, Determination of air quality in cities, Monitoring the air pollution, Source characterization, Emission inventories and modeling, Exposure assessment and effects on health effects, Geographical Iİnformation Ssystem applications; Air Pollution Abatement Measures: Strategies to reduce air pollution from due to residential heating, Strategies for traffic related air pollution, Strategies for industrial air pollution; Case Studies of Urban Air Quality Management From in Mega-Cities.

ÇYÖ515 Global Climate Change and Natural/Meteorological Disasters 3+0 7.5

What is Climate; Climate System and Properties; Global Climate Change; Observed and Expected Changes of Climate Change in the World and in Turkey; Disasters; Natural Disasters; Effects; Natural Disasters with Meteorological Character; Climatological Disasters; Hydrological Disasters; Biological Disasters; Causes and Types; Natural Disasters and Turkey; Temporal and Spatial Distribution of Natural Disasters; Heat Waves; Drought and Desertification; Floods; Typhoons; Strong Wind and Storm; Forest fires; Agricultural Pests; Raw; Frost; Extreme Cold; Lightning; Full; Fog; Measures; Adaptation to Climate Change; Early Warning Systems.

ÇYÖ516 Ecosystem Ecology 3+0 7.5

Concept of Ecosystem: Biological structure, Basic concepts of ecology; Biosphere and Ecosystem: Food chains, Trophic levels, Energy flow, Biogeochemical cycles, Ecological competition; Ecological Factors: Biotic factors, Abiotic factors, Edaphic factors; Ecosystem Development: Biodiversity, Succession, Climax; Big Ecosystems: Territorial ecosystems, Water ecosystems; Environmental Problems: Air pollutants, Water pollutants, Other pollutants.

ÇYÖ517 Air Quality Management 3+0 7.5

Fundamental of Air Pollution: History of air pollution, Components of atmosphere; Effects of Air Pollution: Effects on life and ecosystem; Sources and Measurement Methodologies; Meteorology Dispersion and Modeling: Air pollution meteorology, Dispersion modeling; Global Concerns: Intercontinental pollutant transport, Ozone, Acid deposition, Climate change; Air Quality Laws and Regulations: General approaches, Clean air act; Air Quality Management: Elements of management, Trends in emissions.

ÇYÖ519 Data Analysis in Environmental Science 3+0 7.5

Importance and Management of Data in Environmental Sciences: Data collection, Random sampling; Introduction of Software and Programs Used in Data Analysis; Importance of Big Data for Corporate Environmental Management; Data Summary and Presentation: Histograms, Box plot, Time series plots; Random Variables and Probability Distributions: Distributions of continuous and discrete variables; Decision Making by Hypothesis Testing: One sample, Two samples; Analysis of Variance; Time Series Analysis; Building Experimental Models: Analysis of Multidimensional Data, Correlation and Simple Linear Regression; Statistical Process Control: Pareto Analysis.

ÇYÖ599 Term Project 3+0 0.0

DYS000 Qualifying Exam 0+0 0.0

EDB501 Academic Writing Skills 3+0 7.5

Origins of Scientific Writing: Types of scientific papers, Manuscripts and thesis; Parts of the Manuscript: Title page, Introduction, Methods, Results, Discussion, Conclusion, Acknowledgement, References; Presentation of the Results Effectively in Different Ways: Tables, Figures; Bibliography: Using EndNote software in the bibliography; Ethics: Rights and permissions, The right to become an author and author ranking; Cover Letter: Cover letter preparation; Other Issues: Use of abbreviations, Submitting the manuscript, Evaluation of manuscript writing.

EEM501 (Eng) Advanced Power System Analysis and Smart Grids 3+0 7.5

Utilization of Electric Power; Power System Economics; Electricity Markets; Energy Management Systems; Control of Transported and Distributed Power; Introduction to Smart Grid and Power Grid Operation; New Technologies for Electric Grid; Measurement Technologies: Generation, Transmission, Distribution, and End-user; Wide Area Monitoring System (WAMS); Advanced Metering Infrastructure (AMI); Phasor Measurement Units (PMU); Smart Grid Operations; Renewable Energy Generation; Renewable Energy Integration in Smart Grid; Challenges of Smart Grid.

EEM502 (Eng) Antenna Engineering 3+0 7.5

Antenna fundamentals: Maxwell's equations, Antenna parameters, Friis and radar formula; Radiation Integral and Simple Radiators; Array Theory; Basic Antenna Types: Wire, Microstrip antennas, Broadband antennas; Parallel Plate, Rectangular, Circular and dielectric waveguides; Introduction to Computational Electromagnetics and Method of Moments (MOM); Computer Aided Design (CAD) tools.

EEM504 (Eng) Random Variables and Stochastic Processes 3+0 7.5

Random variables: Introduction to concepts; Probability distribution functions; Probability density functions; Joint probability functions; Functions with random variables; Solutions of function sets; Averages: Expected values of random variables; Conditional expected values; Moments; Chebyshev and Schwarz inequalities; Moment generating functions; Chernoff bounds; Characteristic functions; Vector random variables, joint distributions and densities, means of random vectors, covariance matrices, diagonalization of covariance matrices ; Decision and estimation theory: Parameter estimation; means and covariance matrices of random vectors; Random sequences: Linear systems and random sequences; Large number theory; Stochastic processes: Important stochastic processes; Random input linear systems; Classification of random processes; Mean square calculus: Continuity and derivatives; Stochastic integrals; Stochastic differential equations; Ergodicity; Karhunen-Loeve expansion; Stationary processes and sequences: White noise; Stationary processes and linear systems; Wide sense stationarity; Vectoral processes; State equations; Estimation theory: Orthogonality and linear estimation; Kalman filters; Wiener filters.Random variables: Introduction to concepts; Probability distribution functions; Probability density functions; Joint probability functions; Functions with random variables; Solutions of function sets; Averages: Expected values of random variables; Conditional expected values; Moments; Chebyshev and Schwarz inequalities; Moment generating functions; Chernoff bounds; Characteristic functions; Vector random variables, joint distributions and densities, means of random vectors, covariance matrices, diagonalization of covariance matrices ; Decision and estimation theory: Parameter estimation; means and covariance matrices of random vectors; Random sequences: Linear systems and random sequences; Large number theory; Stochastic processes: Important stochastic processes; Random input linear systems; Classification of random processes; Mean square calculus: Continuity and derivatives; Stochastic integrals; Stochastic differential equations; Ergodicity; Karhunen-Loeve expansion; Stationary processes and sequences: White noise; Stationary processes and linear systems; Wide sense stationarity; Vectoral processes; State equations; Estimation theory: Orthogonality and linear estimation; Kalman filters; Wiener filters.

EEM507 (Eng) Integrated Optical Waveguides 3+0 7.5

Wave Equation; Boundary Conditions for Dielectric Interfaces; Reflection and Phase Shift; Electromagnetic Analysis of the Planar Waveguide: Eigenvalues for the slab waveguide, Guided modes in a waveguide; Dispersion in Waveguides; Wave Equation for Optical Fibers; Power Confinement in a Step-index Fiber; Attenuation and Nonlinear Effects in Waveguides; Wave Equation Analysis of a Rectangular Waveguide; Perturbation Approach and Effective Index Method; Beam Propagation Method for Analyzing Optical Waveguides; Coupled Mode Theory; Device Simulations Using Beam Propagation Method.

EEM508 (Eng) Reliability Analysis in Power System 3+0 7.5

Introduction, reliability definitions, historical development and reliability-cost analysis, Basic probability theory, Component reliability functions, Failure rate models and function and parameter estimation from available past data, System reliability evaluation, Time dependent reliability evaluations for mission-oriented systems, Continuous Markov Chains, Limiting state probability evaluations, frequency and duration, Approximate reliability calculations, Electric power generation and transmission system reliability assessment, Electric power distribution system reliability assessment, Monte-Carlo Simulations.

EEM509 (Eng) Radio Frequency and Microware Circuits 3+0 7.5
Transmission Lines and Smith Chart; Resonators; Impedance Matching Networks; Scattering Parameters; Passive Microwave Devices: Filters, Splitters, Couplers, Isolators, Hybrids; Transistor Amplifiers and Oscillators; Phase Locked Loops (PLLs), Mixers and Detectors; Noise, Distortion and non-linearity calculations for communications systems; Computer Aided Design (CAD) Tools.

EEM511 (Eng) Introduction to Machine Learning 3+0 7.5
Linear and Polynomial Regression, Logistic Regression, Regularization, Maximum Likelihood, Loss Function, Perceptron, Gradient Descent, Back Propagation Algorithm, Bias Variance Tradeoff, Unsupervised Learning, K-Means Clustering, Self-Organizing Map (Kohonen Maps), Learning Vector Quantization, Support Vector Machines, Dimension Reduction Techniques, Principal Component Analysis (PCA), Applications of Classification and Clustering Problems.

EEM513 (Eng) Network Security and BlockChain 3+0 7.5

Basic Concepts: Cryptographic methods, Key encryption methods, Hash functions, Digital certificates, Digital signature, Asymmetric algorithms, Symmetric algorithms, Post-quantum cryptography; Network Security: Network security protocols, Wired, wireless, mobile network security, Cloud systems security, Internet of things security; Cyber Security: Cyberattack types, Access control methods, Authentication, User security, Web security, Application security, Secure software development techniques; Principles of Social Engineering; Blockchain: Fundamental monetary theory, Consensus techniques, Distributed ledger types, Applications.

EEM515 (Eng) Dynamics of Electrical Machinery 3+0 7.5

Basic Concepts: Energy, Electromechanical energy conversion; Direct Current (DC) Motors: Dynamic behavior, Mathematical and circuit models, Transfer functions, Block diagrams, Dynamic response; Synchronous Machines: Mathematical model at the d-q-0 coordinate system, Per-unit quantities, Numerical simulations; Induction Machines: Mathematical model at variable reference coordinate systems, Per-unit quantities, Numerical simulations; Simulations of Electrical Machines in Matlab Simulink-Simscape Environment.

EEM527 (Eng) Advanced Power Electronics Circuits 3+0 7.5
Industrial Applications of Power Electronics; Brief Review on Converters; Various Industrial Applications of Converters. Motor Speed Drives; High Voltage DC Transmission and Utility Applications; Harmonic Standards; Converter Harmonic Mitigation Techniques; Gate and Base Drive Circuits; Snubber Circuits; Component Temperature Control and Heat Sinks; Design of Magnetic Materials.

EEM528 (Eng) GPU Computing 3+0 7.5
Introduction to GPU Programming: PC and GPU Architecture, What is GPGPU, Introduction to CUDA: CUDA API and SDK, CUDA threads; Programming Model: Kernels, Thread hierarchy, Heterogeneous programming, Computing capability; Memory: Memory hierarchy, Device memory, Global memory, Shared memory, Asynchronous access; Asynchronous Concurrent Execution: Concurrent execution between Host and Device, Overlap of data transfer and kernel execution, Concurrent data transfers, Synchronous Calls; Introduction to OpenCL: Basics, Comparison of CUDA and OpenCL.

EEM530 (Eng) Hardware Security and Trusted Circuit Design 3+0 7.5
Security and Protection Aspects in Hardware Design: Vulnerability in digital logic design; Cryptographic Algorithms; Cryptographic Processors: Processor design for block ciphers and public-key algorithms; Side-Channel Attacks and Countermeasures: Power and timing attacks, Fault-injection attack; Fault-Tolerant Computing: Error-correcting codes; Hardware Trojan Horse: Formal methods for secure hardware, Detection strategies; Security of Reconfigurable Devices: Code obfuscation, Random number generators; Hardware metering: Physical unclonable functions; Trusted Computing Platform; Anti-Counterfeiting Methods; Intellectual Property Protection.

EEM534 (Eng) Data-Communication Networks 3+0 7.5
Overview on ISO Model; TCP/IP Stack Base Applications; Wireless Networks and Recent Protocols on Wireless Communications; Security on Networks; Network Security and Vulnerability; Data Security; New Trends and Technologies on Fast Communications; ATM Network Principles; Gigabit Ethernet, 10-Gigabit Ethernet; Voice Over IP Protocols; Fast Multimedia Information Transfer Preliminaries.

EEM541 (Eng) Linear Systems Theory I 3+0 7.5
Linear Spaces and Linear Transformations; Mathematical Description of Continuous- and Discrete-time Systems (Modeling); Input-Output Modeling; Impulse and Pulse Response; Transfer Matrices; State Variables and State-Space Modeling; System Response; Solution to the State Equations of Continuous- and Discrete-Time Linear Time-Varying and

Time-Invariant Systems; Similarity Transforms; Controllability and Observability; Stability; Input-Output Stability; Internal Stability.

EEM545 (Eng) System Modeling 3+0 7.5
Systems and Models; Examples of Models; Models for Systems and Signals; Principles of Physical Modeling; Some Basic Relationships in Physics; Bond Graphs; Computer-Aided Modeling; Introduction to Identification; System Identification as a Tool for Model Building; Program Packages for Identification; Simulation and Model Use.

EEM546 (Eng) Fundamentals of Robotics 3+0 7.5
Introduction to the Fundamental Concepts of Robotics; Description of Local Positions; Orientation and Frames; Transformation Arithmetic; Manipulator Kinematics; Link Description; Actuator Space; Joint Space and Cartesian Space; Inverse Manipulator Kinematics; Algebraic Solution and Geometric Solution; Jacobians; Velocities and Static Forces; Manipulator Dynamics; Trajectory Generation; Control Of Manipulators.

EEM547 (Eng) Fundamentals of Detection and Estimation 3+0 7.5
Random Vectors: Joint distribution and densities, Multiple transformation of random variables, Multidimensional Gaussian distribution, Conditional distributions, Conditional expected values; Parameter Estimation: Linear estimation of vector parameters, Smoothing, prediction and filtering, Maximum likelihood estimators, Significance testing, Hypothesis testing, Bayesian analysis, Confidence intervals; Stochastic Processes: Stationary processes, Ergodicity, systems with stochastic inputs; Spectral Analysis: Correlations and spectra, Linear systems, Factorization and innovations, Matched filter, Spectral representation and Fourier transforms; Karhunen-Loeve Expansion; Queuing Theory and Markoff Processes.

EEM548 (Eng) Power System Protection 3+0 7.5
Principles of Protection of Power Systems: System grounding, Circuit breakers, Fuses, Relay input sources, Optical voltage and current transducers; Fundamental Protection Concepts: Differential, Directional impedance, etc.; Generator Protection: Differential, Negative sequence, Loss of excitation, etc.; Motor Protection: Grounding fault, Locked rotor, Undervoltage, Phase rotation, etc.; Bus Protection; Reactor Protection; Capacitor Bank Protection; Transformer Protection: Differential, Sudden pressure, Over temperature, Low oil, etc.; Line Protection: Directional comparison, Blocking, etc.; Types of Faults in Power Systems.

EEM549 (Eng) Advanced Electrical Machinery 3+0 7.5
Synchronous and Induction Motors; Doubly Fed Induction Motor; High Frequency Motors; Linear Machines; Braking Motors; Motors with External Rotors; Oscillating Motors; Poly-phase Commutator Motors; Schrage Motors; Single-Phase Commutator Motors; Brushless Motors; Hysteresis Motors; Reluctance Motors; Step Motors; Repulsion Motors; Universal Motors; Permanent Magnet Synchronous Machines.

EEM551 (Eng) Control Design Methods 3+0 7.5
Performance Criteria; Design and Compensation Techniques Using Frequency Response Methods; Minor-Loop Design; Improving System Performance By Feed-Forward Control; Controllability; Observability; and Canonical Forms; Relations Between Modern and Classical Techniques; Luenberger Observer; State Feedback; Pole-Zero Assignment Methods.

EEM552 (Eng) Micro-Nanodevices and Thin Film Applications 3+0 7.5
Semiconductor Materials: Material properties, Charge carriers and transport, Generation and recombination, Doping; Solid State Devices Basic Physics: Schrödinger equation, Semiconductor quantum wires-wells-dots; Microelectronic Device Structures: MOS field effect transistor, Bipolar junction transistor, Device operation through energy band diagrams; Thin Films: Fabrication techniques, Vacuum technology, Growth mechanisms, Film characterization techniques, Surface treatments, Thin film solar cells; Nanotechnology: Nanomaterials and nanodevices, State-of-the-arts devices, Future trends; Sustainable Energy Production Technologies.

EEM553 (Eng) Digital Control Theory 3+0 7.5
Discrete-Time Systems; Z Transform; Sampling; Reconstruction; Digital to Analog and Analog to Digital Transformations; Open-Loop and Closed-Loop Discrete-Time Systems; Sampled Data Systems; Response of Discrete-Time Systems; Stability; Digital Controller Design; Pole Assignment; State Estimation; Quantization Errors.

EEM554 (Eng) Nonlinear Control Systems 3+0 7.5
Lyapunov Stability; Advanced Stability Analysis; Stability of Perturbed Systems; Input-Output Stability; Periodic Orbits; Perturbation Theory and Averaging; Singular Perturbations; Analysis of Feedback Systems; Feedback Control; Exact Feedback Linearization; Lyapunov Based Design.

EEM561 (Eng) Machine Vision 3+0 7.5
Introduction: Human and computer vision systems; Cameras and Optics; Light and Color; Stereo and Range Images; Segmentation; Feature Detection and Mapping: Edge detection, Line fitting, Template matching; Multi-Resolution

Representations and Applications; Machine Learning Overview: Clustering, Classification; Subspace Methods: PCA, ICA; Recognition: Feature extraction, Object detection and recognition; Motion and Tracking: Feature Tracking.

EEM562 (Eng) Signal Coding 3+0 7.5
Principles of Signal Representation and Codes; Scalar and Vector Quantization; Quantizer Optimization; Lossless Coding and Entropy; Huffman-Shannon Type Coders; Dictionary Techniques; Predictive Coding; Optimum Prediction Filter Design; DPCM, Sigal Space Representations; Transforms; KLT; Orthogonal and Biorthogonal Systems; Basis Signals and Projections; Sub band Decomposition; Wavelet - Sub band Filter Relation; Wavelet Design; Transform and Wavelet Coding; International Standards Relating to the Covered Subjects.

EEM564 (Eng) Artificial Neural Networks 3+0 7.5
Learning and Generalizing; Perceptron and Linear Decomposition; Multi-Layered Perceptron and Nonlinear Decomposition By Back Propagation Algorithm; Hopfield Model and BAM; Self-Organizing Mapping and Unsupervised Learning Models; Simulated Annealing and Boltzman Machine.

EEM565 (Eng) Image Processing 3+0 7.5
Introduction to Image Processing; Two-Dimensional Discrete-Time Signals; Fourier Representation; Two-Dimensional Sampling and Restoration; Two-Dimensional Anti-Aliasing Techniques; Image Representations; Image Transforms; Basis Vector - Basis Image Relations; Optimum Transforms and Representations; Transforms Such As KLT, DCT, Etc, Dithering, Imaging and Color Spaces; Morphology; Edge Detection and Other Binary Image Operations; Image Enhancement; Projection Based Restoration; Image Reconstruction; Image Segmentation and Object Extraction.

EEM566 (Eng) Pattern Recognition 3+0 7.5
Introduction to 1-D, 2-D and Multi-Dimensional Pattern Recognition; Bayes Decision Theory; Decision Boundaries; Classifiers and Discriminating Functions; Parameter Estimation; Clustering; Specification Selection; Image Grammar and Language; Artificial Intelligence in Pattern Recognition; Applications of Artificial Neural Networks.

EEM567 (Eng) Advanced Computer Architecture 3+0 7.5
Introduction: Technological trends, Cost and performance; Quantitative Principles of Computer Design; Instruction Set Architecture Design: Classifying ISAs, Role of compilers, MIPS Architecture; Pipelining: Data and control hazards; Pipelining Implementations and Multicycle Operations, MIPS R4000 Pipeline; Instruction Level Parallelism: Dynamic scheduling and branch prediction, Overview of superscalar, Loop unrolling; Static Branch Prediction; Memory hierarchy Design and Caches: Cache performance, Cache design issues, Main memory design issues; Overview of Interconnection Networks: Connecting two computers, Connecting more than two computers, Examples of interconnection Networks.

EEM592 (Eng) Seminar 3+0 7.5

EEM599 (Eng) Semester Project 3+0 0.0

EEM603 (Eng) Function Space Methods in Engineering 3+0 7.5
Sequences; Series; Limit; Continuity; Differentiation; Riemann Integral; Proof Methods; Lebesgue Spaces; Fourier Series; Fourier Transformations; Hardy Spaces and Engineering Applications of Hardy Spaces; Optimization Methods; Optimization Applications in Engineering.

EEM604 (Eng) Optimization in Power Systems 3+0 7.5
Optimisation Theory; Classification of Mathematical Programming Methods; Hydro-electric and Thermal Plant Modelling; Economic Dispatch of Thermal Units; Transmission Losses; Unit Commitment Problem in Interconnected Network; Methods of Load Forecasting; Optimal Power Flow; Cost Models for Planning.

EEM605 (Eng) Power Systems Stability 3+0 7.5
Stability Definitions; Simulation Methods; One-Machine System Stability; Swing Equations; Equal Area Criteria; Multi-Machine System Stability; Mathematical Models of Synchronous Machine; Phase Models; (d-q-0) Model; State-Space Models; Excitation and Prime Mover System Models; Stability Analysis.

EEM606 (Eng) Parallel Computer Architecture 3+0 7.5
Introduction: Why parallel architecture, Convergence of parallel architectures; Fundamental Design Issues; Shared Memory Multiprocessors: Cache coherence, Memory consistency, Synchronization; Snoop-Based Multiprocessor Design: Single-Level Caches with an Atomic Bus, Multilevel Cache Hierarchies, Split-Transaction Bus, Case Studies; Scalable Multiprocessors; Directory-Based Cache Coherence: Directory Protocols, Memory-Based Directory Protocols, Cache-

Based Directory Protocols, Synchronization; Hardware/Software Trade-Offs; Interconnection Network Design: Interconnection Topologies, Routing, Switch Design, Flow Control, Case Studies.

EEM607 (Eng) Parallel Computing 3+0 7.5
Introduction: What is parallel computing?, The scope of parallel computing; Models of Parallel Computers: Parallel architectures, Interconnection networks, Routing and communication cost; Basic Communication Operations: One-to-All and All-to-All Broadcast, One-to-All and All-to-All Personalized Communication, Circular shift; Performance and Scalability of Parallel Systems: Performance metrics, The Scalability of Parallel Systems, The Isoefficiency Metric; Parallel Programming: Parallel Programming Paradigms, Message-Passing Programming Paradigm, Shared-Address-Space Programming Paradigm, Data-Parallel Languages; Dense Matrix Algorithms; Solving Sparse Systems of Linear Equations; Sorting; Parallel I/O.

EEM608 (Eng) Advanced Linear Control Design 3+0 7.5
Elements of convex analysis; Special algorithms for convex optimization: cutting-plane algorithms, ellipsoid algorithms, Ritz approximations; Controller design specifications and approaches: multi-criterion optimization; Robustness specifications.

EEM609 (Eng) Multivariable Control Systems I 3+0 7.5
Review of linear algebra: Invariant subspaces, matrix dilation problems; Linear dynamical systems: Lyapunov equations, balanced realizations; Performance specifications: Hilbert and Hardy spaces, Induced system gains; Stability and performance of feedback systems; Performance limitations; Model reduction by balanced truncation and Hankel norm approximation; Model uncertainty and robustness.

EEM610 (Eng) Multivariable Control Systems II 3+0 7.5
Linear Fractional Transformation; Structured Singular Values; Parameterization Of Stabilizing Controllers; Algebraic Riccati Equations; H-2 Optimal Control; Linear Quadratic Optimization; H-Infinity Control; Controller Order Reduction.

EEM617 (Eng) Special Topics in Systems Theory 3+0 7.5
Some Current Special Topics in Systems Theory: Finite-dimensional and infinite-dimensional systems, Controllability and observability of infinite-dimensional systems, Systems described by partial differential equations, Systems described by delay-differential equations, Pointwise and distributed time-delay systems, Retarded and neutral systems, Controllability and observability of time-delay systems, Pointwise and distributed parameter systems, Discrete-event and hybrid systems, System identification.

EEM618 (Eng) Power Quality Analysis 3+0 7.5
Definition of Power System Transients; Transient Events During Normal Operation; Transient Events During Faults; Monitoring Methods of Transients and Detection of Quality Features; Analysis Methods Using DFT and Wavelet Transforms; Analysis of Power Quality Using Symmetrical Sequence Components; Simulation Methods and Applications; Analysis of Example Systems Through Simulations.

EEM619 (Eng) Wireless Communication 3+0 7.5
Wireless Channel Modeling: Path loss and shadowing; Statistical Fading Models; Time Diver-sity: Coding and Interleaving; Antenna (Spatial) Diversity; Frequency Diversity; Direct-Sequence Spread Spectrum; Multi-Carrier Systems: OFDM; Narrowband Cellular Systems; CDMA: Generation of Pseudonoise Sequences, Power Control, Handoff, Averaging; Capacity of Wireless Channels.

EEM620 (Eng) Special Topics in Control Engineering 3+0 7.5
Some Current Special Topics in Control Engineering: Decentralized and hierarchical control, Control of infinite-dimensional systems, Stabilization of infinite-dimensional systems, Infinite-dimensional controllers, Stabilizing controller design, Robust control, Robust servomechanism problem, Control of time-delay systems, Time-delay controller design, Distributed control, Optimization in control, Control of discrete-event and hybrid systems, Supervisory control.

EEM621 (Eng) Nano and Micro-Fabrication Techniques 3+0 7.5
Cleanroom Environment, Safety and Processing; Micrometrology and Materials Characteriza-tion; Material Properties, Crystal Structure and Growth of Silicon; Thin-Film Materials and Processes: PVD, CVD, PECVD, ALD, Metallic thin films, Oxide and nitride thin films, Pol-ymer films; Advanced Thin Films; Pattern generation and optical lithography; Wet, Dry and Ion Beam Etching; Thermal Oxidation; Nano and Micro-Fabrication Equipment.

EEM623 (Eng) Advanced Digital Signal Processing 3+0 7.5
Signal Models; Adaptive Filtering; Signal Spaces: Orthogonality; Hilbert and Banach Spaces; Projection Theorem Representation and Approximation: Least squares fitting; Minimum Mean Square Estimation; Wiener Filtering; Lp Optimization Linear Operators and Matrix Inversion; Matrix Factorizations: LU Factorization; Cholesky Decomposition;

Unitary Matrices; House-holder Transformation; Givens Rotations Eigenvalues and Eigenvectors: Matrix Diagonaliza-tion; PCA; Eigenfilters; Signal Subspace Techniques Singular Value Decomposition and Its Applications; Special Matrices and Their Applications: Toeplitz and Circulant Matrices; Dur-bin Algorithm; Lattice Filters.

EEM624 (Eng) Advanced Topics in Deep Learning 3+0 7.5

Machine Learning Basics; Deep Feedforward Networks: Gradient based learning; Optimization for Deep Models; Convolutional Neural Networks; Model-free Deep Reinforcement Learning; Model-based Deep Reinforcement Learning; Inverse Reinforcement Learning; Recurrent Neural Networks; Markov Decision Processes; Monte Carlo Methods; Linear Factor Models; Deep Generative Models: Variational autoencoders, Representation learning, Generative adversarial networks.

EEM625 (Eng) Advanced Topics in Digital Systems I 3+0 7.5

Combinational Logic Circuits; Sequential Logic Circuits; Finite State Machines; Logic Synthesis; Logic Simulation; Timing Analysis; Hardware Description Languages; VHDL; Hardware Software Codesign Methodology; Power; Performance; Security; Side-channel Resistant Design; Advanced Architectural Design; Partitioning; Hardware to Software İnterfacing Techniques; Memory; Scratchpad; Cache; High-Level Synthesis; Data Types for HLS; Loops for HLS; Verification; Test; Design Space Exploration; Efficient Hardware Accelerator Design; Advanced FPGA Applications.

EEM641 (Eng) Sensor Array Signal Processing 3+0 7.5

Introduction: Sensor array geometry and mathematical model, Narrowband model and assumptions; Direction of Arrival Estimation: Classical methods, Spectral-MUSIC, Root-MUSIC, ESPRIT, Min-Norm, Stochastic and deterministic maximum likelihood methods, Spatial smoothing, Virtual array, Array interpolation, Cramer Rao lower bound; Array Signal Processing for Communications: Beamspace processing, Delay-and-sum beamforming, Filter and-sum beamforming, Capon, MVDR beamforming, Robust beamforming; Source Localization: Triangulation, Least squares methods, Error ellipse, Stansfield, Maximum likelihood methods, Time-difference of arrival techniques for source localization.

EEM642 (Eng) Linear Systems Theory II 3+0 7.5

Polynomial Matrices; Multi-Input Multi-Output (MIMO) Poles and Zeros; Minimal Realization of MIMO Systems; Equivalent Systems; Identification By Markov Parameters; State Feedback; State Observers; Static and Dynamic Output Feedback; Pole Assignment; Servomechanism Problem; Diagonalization; Composite Systems; Mathematical Description; Controllability; Observability; Stability; Controller Design.

EEM643 (Eng) Estimation Theory 3+0 7.5

Deterministic Least-Squares Parameter Estimation and the RLS Adaptive Filter Algorithm; Stochastic Least-Squares Parameter Estimation: Least-squares estimation and linear least-squares estimation, MAP estimation; ML estimation and Cramer-Rao lower bound, Innovations process; Wiener Theory For Scalar Processes: Continuous-time and discrete-time Wiener smoothing, Continuous-time and discrete-time Wiener-Hopf equations and causal Wiener filters., Application to prediction and additive white-noise problems; The Discrete-time Kalman Filter: Predicted estimator, Time and measurement-update, Filtered estimator forms, Linearized and extended Kalman filters, Kalman Filter For Smoothed Estimators: Bryson-Frazier formulas; Array Algorithms.

EEM645 (Eng) System Identification 3+0 7.5

Systems and Models; Signal Spectra; Singular Realization Behavior and Ergodicity Results; Simulation and Prediction; Modal Sets; Modal Structures and Identifiablity; Nonparametric Time and Frequency Domain Methods; Transient Response Analysis and Correlation Analysis; Frequency Response Analysis; Parameter Estimation Methods; Using Frequency Domain Data to Fit Linear Models; Convergence and Consistency; Consistency and Identifiability; Asymptotic Distribution of Parameter Estimates; Subspace Methods for Estimating State Space Models.

EEM646 (Eng) Fuzzy Systems 3+0 7.5

Fuzzy Control from an Industrial Perspective; Capabilities and Restrictions of Fuzzy Control; Knowledge Based Controllers; Classical Set Theory; Mathematics of Fuzzy Control; Fuzzy Sets; Fuzzy Relations; Approximate Logic; Representation of a Rule Set. Fuzzy Knowledge Based Controller (FKBC) Design Parameters; Structure of FKBC; Rule Base; Knowledge Base; Decision Mechanism; Fuzzification and Defuzzification Methods; Nonlinear Fuzzy Control; FKBC Types; Adaptive Fuzzy Control; Stability of Fuzzy Systems.

EEM651 (Eng) Signal Transforms 3+0 7.5

Concept of Signal Space; Signal Representations; Orthogonal Spaces and Transforms: Least-squares representation, decorrelation, 2D expansions; Short-time Fourier Transforms and Frames; Subband decomposition, Filterbank structure and implementation constraints; Time-frequency Representations and Wavelets; Relations of Discrete Wavelets and Subband Decomposition, Wavelet Design - Filterbank Design; Compression and Efficient representation applications.

EEM652 (Eng) Optimal Control 3+0 7.5
Pontryagin's Minimum Principle; Hamilton-Bellman-Jacobi Equations; Calculus of Variations; Fundamental Concepts; Functionals of a Single Function; Functionals Involving Several Independent Functions; Piecewise-Smooth Extremals; Constrained Extrema; Optimal Control Problems; Necessary Conditions; Minimum-Time and Minimum-Energy Problems; Singular Intervals; Linear Quadratic Optimal Control; Finite Horizon and Infinite Horizon Problems.

EEM656 (Eng) Large-scale Systems 3+0 7.5
An Overview of Large-Scale Systems; Interconnected Systems; Decentralized Systems; Hierarchical Systems; Multi Time-Scale Systems; Stability of Large-Scale Systems; Decentralized Fixed Modes; Decentralized Control; Hierarchical Control; Multi Time-Scale Control; Disjoint and Overlapping Decompositions; Constrained Optimization and Decentralized Optimal Control; Robust Controller Design Methods for Large-Scale Systems.

EEM657 (Eng) Control of Robotic Systems 3+0 7.5
Robot Dynamics; Fundamental Control Methods Applied to Robotic Systems; Control Problems for Robot Manipulators; Position and Velocity Control; Multi-Input Multi-Output Control Systems and Robotics Applications; Cartesian Based Control Systems; Computed Torque Method; Robust Control for Robot Manipulators; Adaptive Control; Force Control; Hybrid Position and Force; Industrial Robot Control Systems.

EEM658 (Eng) Adaptive Control 3+0 7.5
Real-time Parameter Estimation; Least-squares and Regression Models; Estimating Parameters in Dynamical Systems; Self-Tuning Regulators; Model-Reference Adaptive Systems; Properties of Adaptive Systems; Stability; Convergence; Robustness; Averaging; Auto-Tuning; Gain Scheduling; Design of Gain-Scheduling Controllers; Nonlinear Transformations; Practical Issues and Implementation.

EEM660 (Eng) Discrete Event Systems 3+0 7.5
Introduction to Discrete Event Systems; Modelling Methods: Petri nets, Automata, Formal languages; Mathematical Formalisms; Types, and Properties of Modelling Methods; Supervisory Control Design: Forbidden state control approach for all modelling methods, Structural and behavioural control approaches for Petri nets.

EEM661 (Eng) Advantage in Cryptology 3+0 7.5
Public-key cryptography: RSA systems, dicrete logarithm systems, elliptic curve systems; Finite field arithmetic; Elliptic curve arithmetic: elliptic curves, point representation and the group law, point multiplication, Koblitz curves; Elliptic curve cryptography; Implementation issues, applications of elliptic curves: factoring, primality test.Public-key cryptography: RSA systems, dicrete logarithm systems, elliptic curve systems; Finite field arithmetic; Elliptic curve arithmetic: elliptic curves, point representation and the group law, point multiplication, Koblitz curves; Elliptic curve cryptography; Implementation issues, applications of elliptic curves: factoring, primality test.

EEM667 (Eng) Statistical Signal Processing 3+0 7.5
Signal Modeling; Least Squares Method; Pade Approximation; Stochastic Models; ARMA; AR; MA Models; Levinson Recursion; Lattice Filters; FIR and IIR Filters; Wiener Filter; FIR and IIR Types; Spectrum Estimation; Parametric and Nonparametric Methods; Minimum Variance Spectrum Estimation; Maximum Entropy Methods; Frequency Estimation; Adaptive Filtes; FIR; IIR and Recursive Types.

EEM692 Seminar 3+0 7.5

EEM790 (Eng) Thesis 0+1 30.0

EEM890 (Eng) Thesis 0+1 30.0

EEM890-0 Thesis (Thesis Proposal) 0+1 30.0

EKİM510 (Eng) Organic Chemistry of Biomaterials 3+0 7.5
Carbohydrates: Monosaccharides, Polysaccharides, Synthesis and reactions; Lipids: Basic properties, Fatty acids, Triglycerides, Terpenes, Steroids, Reactions and synthesis; Amino Acids, Peptides, and Proteins: Reactions and synthesis,

Primary, secondary and tertiary structures of proteins, Structures and functions of enzymes; Nucleic acids: Nucleosides, Nucleotides, DNA, RNA.

EKİM511 Advanced Organic Chemistry I 3+0 7.5

Basic Concepts: Electronegativity, Hybridization, Molecular orbital theory, Bond formation, Formal charge and oxidation steps, Acid-base theory; Stereochemistry and Conformational Analysis; Reaction Thermodynamics and Kinetics; Nucleophilic Substitution Reaction Mechanisms (SN1, SN2); Elimination (E1, E2, E1Cb) and Addition Reaction Mechanisms; Carbonyl Compounds: Addition reactions, ?-Position reactivity, Condensation reactions; Reactions of Carboxylic Acids and Their Derivatives; Conjugated Unsaturated Systems; Aromaticity and Reactions of Aromatic Compounds.

EKİM512 Advanced Organic Chemistry II 3+0 7.5

Carbocations and Their Rearrangement Reactions; Rearrangements in Electron-Deficient Systems; Carbens and Their Reactions; Nitrenes and Their Reactions; Radical Reactions and Mechanisms; Pericyclic Reactions: Frontier molecular orbitals, Woodward-Hoffmann rules, Electrocyclic Cycloadditions, Sigmatropic, and Cheletropic Reactions; C-C Bond Formation and Other Reactions using Transition Metal Organometallic Compounds: Cross-Coupling reactions, Olefin metathesis, and Homogeneous catalytic hydrogenation of olefins.

EKİM513 Gas Chromatography and Applications 2+1 7.5

Fundamental Principles of Gas Chromatography; Components of Gas Chromatography; Injection Systems; Columns: Types of columns, Column Materials; Dedectors; Mass spectrometer; Ionization: Electron impact, Chemical ionization; Mass Analyzer: Magnetic sector, Quadrupole, Time of flight, Ion trap; Analysis: Selecting and preparation of samples, Method development for temperature programing, Qualitative analysis, Quantitative analysis, Structral analysis with mass spectrometer.

EKİM514 Heterocyclic Chemistry 3+0 7.5

Heterocylic Compounds: Classification and nomenclature of heterocyclic compounds; Three Membered Heterocyclic Compounds: Properties, synthesis and reactions of three-membered heterocyclic compounds containing one and two heteroatoms; Four Membered Heterocyclic Compounds: Properties, synthesis and reactions of four-membered heterocyclic compounds containing one and two heteroatoms; Five Membered Heterocyclic Compounds: Properties, synthesis and reactions of heteroaromatic compounds containing one, two, three and four heteroatoms; Other Heterocyclic Compounds.

ENM501 Design and Analysis of Experiments 3+0 7.5

Introduction to Design of Experiments; One Factor Variance Analysis-ANOVA; Model Adequancy Checking; Blocking and Confounding; Introduction to Factorial Design; 2k Design; Fractional Factorial Design; 3k Factorial Design; Mixture Design and Analysis; Response Surface Method.

ENM502 Production Management Systems 3+0 7.5

Concept of Computer Aided Production Management; Production Lines and Their Modeling; Using Analytical and Heuristic Approaches in Assembly Line Balancing; Pull and Push Production Systems; Just in Time Production (JIT) Approach; Kanban Systems and Design of Kanban Systems; Alternative Systems to Kanban; Optimum Production Technology Approach; Group Technology and Cellular Manufacturing; Design and Application of Flexible Manufacturing Systems; Production Systems Scheduling and New Trends in Control.

ENM503 Advanced Techniques in Linear Programming 3+0 7.5

Theoretical Foundation of Linear Programming and Simplex Algorithm: Big M, Two-Phase, Single-Artificial Variable, Dual Simplex, Revised Simplex Algorithms; Duality Theorem and Its Applications; Sensitivity Analysis and Parametric Programming; Goal Programming and Its Applications; Data Envelopment Analysis and Its Applications; Cutting Planes; Bounded Variable Technique; Interior Point Algorithms.

ENM504 Decision Making Methods 3+0 7.5

Decision Analysis; Decision Analysis Basic Concepts; Decision Making Under Certainty; Uncertainty and Risk; Bayes Decision Theory; Decision Tree; Utility Theory; Multi Criteria Decision Making; Analytical Hierarchy Process; ELECTRE; Decision Model Applications.

ENM505 Sequencing and Scheduling 3+0 7.5

Role of Sequencing and Scheduling; Classes of Scheduling Problems; Single Machine Scheduling; Parallel Processing and Batch Sequencing Assembly Line Balancing Problem; Network Based Scheduling; Manpower Scheduling; Common Scheduling Problems and Heuristics: Backward-forward Heuristic; Early and Late Penalties; Common Due Date; Scheduling with Meta-Heuristics: Simulated Annealing and Taboo Search.

ENM508 Reliability of Systems 3+0 7.5
The Concept of Reliability; Obtaining Reliability Function; Weibull Distribution; Utility Time of Elements; System Reliability as a Function of Component Breakdown; Reliability Block Diagrams and Failure Trees; Abrasion and Reliability; Reliability of Serial and Parallel Systems; Network Reliability; Measurements and Tests of Reliability; Applications of Reliability in Manufacturing and Service Systems.

ENM509 Supply Chain Management 3+0 7.5
Basic Concepts of Supply Chain and Logistics Systems; Using Mathematical Models and Numerical Techniques in the Analysis of Supply Chain and Logistics Systems; Analyzing Basic Components of Supply Chain: Procurement, Inventory, Production and Transportation; Structural Analysis of Production and Inventory Systems; Modeling Stochastic Supply-Timed Inventory Systems and Solution Approaches; Modeling Multi-Stage Inventory Systems and Solution Approaches; Coordination of Material, Information and Financial Flows in Supply Chain; SCOR Model.

ENM512 Research Techniques in Human Engineering 3+0 7.5
Introduction to Human Factors Engineering: Definition, Scope, and Aims; The Importance of Human Factors Engineering with Respect to Industrial Engineering and Management; Evoluation of Working; Evolution of the Supply of Performance; Anatomical and Mechanical Structure of the Human Body; Analysis of Working Environments with Respect to Anthropometry; Working Conditions; Designing Workplaces According to Ergonomics Principles; Machine System Protections; Work Accidents; Shift Working.

ENM514 Mathematical Programming 3+0 7.5
Importance of Modeling, Difficulties in Solving Process; Linear Modeling Examples; Integer Linear Modeling Examples; Network Models; Fundamental Solution Techniques for Linear Models; Fundamental Solution Techniques for Integer Linear Models; Non-Linear Modeling Examples; Fundamental Solution Techniques for Non-Linear Models; Introduction to GAMS and Lingo Software; Rules to Express a Model Using GAMS; Solving a Model With GAMS and Interpreting Solution Report; Tricks About Modeling and GAMS.

ENM515 Energy Systems 3+0 7.5
Basic Concepts in Thermodynamics: Internal Energy; Enthalpy; Open and Closed Systems; Entropy and Exergy; Power Cycles; Power Cycles; Solar Energy: Passive Solar Systems; Active Solar Systems; Geothermal Energy: Heating; Ground Source Heat Pumps; Power Generation; Wind Energy: Wind Measurements and Power Estimation; Wind Energy: Wind turbines; Economic Analysis of Energy Systems.

ENM516 Multi Criteria Decision Making 3+0 7.5
Multi Criteria Decision Making (MCDM) Terminology; MCDM Concepts; Relation between Multi Criteria and Multi Objective Decision Making; Methods for Discrete MCDM Problems; Multi Attribute Utility Theory; Analytic Hierarchy Process and Analytic Network Process; Outranking Procedures; ELECTRE I Method, ELECTRE III Method, Promethee Method; Theories of Interactive Methods; Interactive Approaches to Linear and Quasiconcave Utility Functions.

ENM517 Special Topics in Facilities Planning 3+0 7.5
Facilities Planning Process; Quantitative Models for Facilities Planning; Facility Location Models; Constructing Iso-Cost Contour Lines; Special Facility Layout Planning Models and Design Algorithms; Machine Layout Models; Conventional Storage Models; Automated Storage and Retrieval Systems; Order Picking Systems; Fixed-Path Material Handling Models; Waiting Line Models; Simulation Models.

ENM518 Metaheuristics 3+0 7.5
Optimization: Models and methods; Basic Concepts in Metaheuristics: Performance analysis for metaheuristics; Single Solution Based Metaheuristics: Local search, Simulated annealing, Taboo search, Iterated local search, Variable neighborhood search, Guided local search; Population Based Metaheuristics: Evolutionary algorithms, Scatter search, Ant colony optimization, Particle swarm optimization, Bees colony, Artificial immune system.

ENM519 Strategic Choice and Planning in International and National Contex 3+0 7.5
Basic Concepts of Strategic Management: Vision, Mission, Strategy, Policy; Strategic Management in Business: Definition, Purpose and characteristics of strategic management, Strategic management process and phases; Competitive Analysis Providing Strategic Choice and Decision-Making in Competitive Environment and Portfolio Analysis; Structure of the Strategy Implementation Process and Style of Planning; Review, Evaluation and Control of Strategies; Analysis of the Problems Faced by National and International Firms to Select Market; Market Entry Modes; Joint Venture; Direct Foreign Investment; International Strategic Alliances.

ENM520 Advanced Management Technics 3+0 7.5

Basic Concepts of Advanced Management; Classical approaches, Scientific management, First managerial theories, Bureaucracy approaches, Human relations and Behavioral science approaches; First Contributions to the Theory of Organization and Decision-Making; Systematist Thought and the Emergence of Open Systems Approach; Modern Approaches to Management: Reengineering, Balanced Scorecard, Production methods, Total quality management; Chaos Theory and Methods of Decision-making in Chaos; Performance Measurement, Absenteeism; Case Study Discussions.

ENM521 Advanced Production Systems 3+0 7.5

Introduction; Comparison of Traditional and Advanced Production Systems: Trends, Manufacturing (Structure); Introduction to Manufacturing Systems Engineering; Manufacturing Systems Engineering; CAD and Product Design: CAM, CIM; Group Technology and Cellular Manufacturing System; Transition to Cellular Manufacturing System; Trends of Cellular Production System; Cellular Manufacturing System and Mass Individualization; Flexible Manufacturing System and Agile Manufacturing System; Value Streams Maps; Restriction of Theory; Future of Factory (Green Factory); Green Manufacturing, Recycles; Conclusions.

ENM522 Multivariate Statistics,Application Tools and Techniques 3+0 7.5

Multivariate Random Distributions; Matrices: Linear Transformation; Eigenvectors and Eigenvalues; Principal Component Analysis: Total Variation Explained by Principal Components; Factor Analysis: Barlett tests, Orthogonal factor models, Factor rotation and factor scores; Cluster Analysis Methods; Discriminant Analysis; Structural Equation Modeling; Path Analysis; Model Fit Indices; Model Testing and Model Modifications; Models with Non-Normal or Small Data Bootstrapping; Application Tools and Techniques of Multivariate Data Analysis.

ENM523 Introduction to Mathematical Optimization 3+0 7.5

Some Important Extremal Problems; One Variable Optimization; Methods in One Variable Optimization; Multivariable Optimization; Gradient Method; Affine Sets; Convex Sets; Separation Theorem; Polyhedral Sets; Corner Points; Cones; Convex Functions; Directional Derivatives; Subdifferential; Nonlinear Programing; Convex Programming Problem; Duality Theory in Convex Programming; Simplex Method; Penalty Function Method.

ENM524 Predicting with Machine Learning 3+0 7.5

Fundamental Concepts of Learning; Data Representation; Supervised Learning; Classification; Regression; Unsupervised Learning; Association Analysis; Clustering; Dimensionality Reduction; Feature Extraction; Model Validation; Parameter Optimization.248

ENM525 Modeling and Analysis of Time Series Using R 1+2 7.5

Time Series Data, Decomposing Time Series Data İnto Trend, Seasonal and Random Components, Correlation, Autocorrelation, Exponential smoothing and HoltWinters Methods, Prediction Strategies, Basic Stochastic Models: AR (p) processes, Regression: Simple linear regression, Regression models with seasonal effect, Logarithmic regression, Harmonic regression, Stationary Models: MA (q) processes, Non-stationary models (ARIMA models).

ENM527 Logistics Modeling and Optimization 3+0 7.5

Distribution, Transportation, Communication Networks: Applications for optimal location of service facilities and routing of vehicles, Modeling, Theory, Algorithms; Networks: Fixed charge facility location problems, P-median, P-center, Covering problems, Hub location problems; Tools for the Analysis of Location Problems; Linear Programming and Lagrangean Relaxation; Vehicle Routing Problems (VRP): Construction and improvement algorithms, Location-routing problems; Multi Objective Logistics Problems; Hill Climbing Algorithms; Simulated Annealing Algorithms.

ENM592 Seminar 3+0 7.5

ENM599 Term Project 3+0 0.0

ENM601 Introduction to Convex Analysis 3+0 7.5

Convex Sets; Topological Properties of Convex Sets; Hyperplanes; Polyhedral Sets; Separation Theorems for Convex Sets; Convex and Concave Functions; Continuity and Differentiability of Convex Functions; Directional Derivative; Subdifferential; Subdifferentiability of Convex Functions; Second Order Differentiability; Positive Definiteness; Positive and Negative Definite Matrices; Positive Definiteness and Convexity Conditions; Optimality Conditions for Convex Unconstrained Optimization Problems; Weierstrass Theorem.

ENM602 Stochastic Analysis 3+0 7.5
Stochastic Functions and Characteristics of Stochastic Functions; Conditional Expectation; Conditional Independence; Types of Convergence of Sequence of Random Variables; Continuity, Differentiation and Integration of Stochastic Functions; Special Types of Stochastic Processes: Markov processes, Poisson processes, Gauss processes, Poisson processes, Gauss processes, Wiener processes; Stochastic Integral and Stochastic Differential Equation; Ito?s Formula; Some Applications of Stochastic Integration and Stochastic Differential Equations.

ENM603 Unconstrained Optimization 3+0 7.5
Examples of extremal problems; Mathematical modeling; Convex sets and convex functions; Directional derivative; Subdifferential; One-variable unconstrained optimization; Line search without using derivatives; Bisection search method; Newton's method; Multidimensional search using derivatives; Method of steepest descent; Multivariable method of Newton; Subgradient Optimization.

ENM604 Constrained Optimization 3+0 7.5
General Definition of Constrained Optimization Problems; Convexity Properties; Optimality Conditions for Constrained Optimization Problems; Fritz John Optimality Conditions, Karush-Kuhn-Tucker Optimality Conditions; Definition of the Dual Problem and Formulation; Duality Theorems; Lagrangian Duality; Saddle Point Optimality; Solution Methods in Constrained Optimization; Subgradient Methods; Cutting Plane Method; Penalty Function Methods; Augmented Lagrangian Penalty Functions; Augmented Lagrangian Method of Multipliers; Modified Subgradient Method.

ENM605 Operations Research in Healthcare 3+0 7.5
Fundamentals of Operations Research; Modeling; Assignment Problems: Nurse-to-patient assignment problems; Healthcare Planning: Demand forecasting, Location selection, Capacity planning; Queue Management and Design; Healthcare Systems Scheduling Problems: Patient scheduling, Nurse scheduling; Workforce and Workload Models; Workload Balancing; Application of Decision Making Methods.

ENM606 Multi-Objective Optimization 3+0 7.5
Fundamentals of Decision Making in Multi-objective Environment; Ordering Relations in Vector Spaces; Cones; Ordering Relations and Cones; Various Concepts of Efficient Solutions in Multi-objective Optimization; Pareto Optimal Points and Pareto Optimal Solutions; Characterization of Efficient Solutions; Scalarization Methods: Epsilon constraints method, Benson method, Conic scalarization method; Comparison of Different Scalarization Methods; Goal Programming.

ENM608 Fuzzy Sets and Systems 3+0 7.5
The Concept of Fuzziness and Linguistic Variables; Mathematical Expression of Fuzziness; Definition of Membership Function; Construction of Membership Functions; Fuzzy Numbers and Variables; Fuzzy Set Operations: Algebraic operations, ?-cuts; Convex Fuzzy Sets; Transpose Techniques; Analysis of Decision Models in Fuzzy Environments; Fuzzy Decision Models; Fundamental Application Areas of the Fuzzy Set Theory in Industrial Engineering.

ENM610 Finance Engineering 3+0 7.5
Introduction to Brownian Motion: Properties and financial applications; Stochastic Processes with Jump; Poisson Process; Options; Options as an Instrument of Volatility; Tools for Volatility Engineering: Volatility swaps and volatility trading pricing; Tools in Financial Engineering: Classical Black- Sholes option pricing model, Merton's three assert option pricing model; Jump - Diffusion Option Pricing; Cox- Rubenstein Model; Optimal Portfolio and Consumption Models; Scheduled and Unscheduled Stochastic Events.

ENM612 Data Mining with Mathematical Programming 3+0 7.5
Overview of Data Mining; Data Mining Problems: Clustering, Classification, Association analysis; Clustering Problems and Solution Methods: Mathematical programming to solve clustering problem; Classification Problems and Solution Approaches: Approaches based on mathematical programming, Robust linear programming, H-polyhedral separation, Max-min separation, Support vector machines; Classification Approaches Based on Polyhedral Conic Functions (PCF): Polyhedral conic functions algorithm, Integer programming model, Kmeans clustering for large-scale problems; Association Analysis Problems and Solution Approaches.

ENM614 Material Handling and Warehousing Systems 3+0 7.5
Fundamental Concepts of Material Handling: Importance and scope of material handling in manufacturing, Principles, Unit load; Material Handling Systems: Vehicles, Conveyors, Carousels, Automated guided vehicles (AGV); Warehousing: Importance of warehousing, Components, Operations; Warehouse Site Selection; Warehouse Design: Stock keeping unit (SKU), Storage methods, Racking systems, Warehouse layout; Automated Storage and Retrieval Systems (AS/RS); Efficiency in Material Handling and Warehousing; Measurement of Warehouse Performance; Modeling and Simulation of Material Handling and Warehousing Systems.

ENM616 Ergonomics and Occupational Biomechanics 3+0 7.5
Ergonomics; Human Body: Motion system, Neural system, Energy expenditure, Muscular and skeletal systems; Applied Anthropometry; Topics Related to Work Physiology and Biomechanics; Principles of Ergonomics at Work; Engineering Anthropometry and Its Applications; Energy Expenditure at Work; Work Design: Principles of work design; Occupational Disorders; Low-Back Disorders.

ENM618 Advanced Techniques in Simulation 3+0 7.5
General Principles of Simulation; Modeling of Complex Systems; Establishment of Reliable and Valid Simulation Models; Comparison and Evaluation of Alternative System Structures; Variance Reduction Methods; Experimental Design and Optimization; Simulation of Manufacturing and Material-Handling Systems with ARENA Program; Simulation of Computer Systems; Simulation of Computer Networks.

ENM620 Heuristics and Matheuristics in Operations Research 3+0 7.5
Mathematical Modeling: Location problems, Vehicle routing problems, Location-routing problems, Scheduling problems; Heuristics: Construction heuristics, Improvement heuristics; Metaheuristics: Simulated annealing, Ant colony algorithm, Genetic algorithm, Variable neighborhood search, Adaptive large neighborhood search; Decomposition Matheuristics: Cluster first route second approaches, Two phase approaches, Partial optimization approaches, Rolling horizon approaches; Improvement Matheuristics: One-shot approaches, MILP models for local optimization; Multi objective matheuristics.

ENM627 Dynamic Programming 3+0 7.5
Theory and Practice of Dynamic Programming; Sequential Decision Making Over Time; Optimal Value Function and Bellman's Functional Equation for Finite and Infinite Horizon Problems; Introduction of Solution Techniques: Policy iteration, Value iteration, and Linear programming; General Stochastic Formulations; Markov Decision Processes; Dynamic Programming Applications: Network flow, Resource allocation, Inventory control, Equipment replacement, Scheduling and queueing control.

ENM629 Mathematical Statistics 3+0 7.5
Parameters and Characteristics; Statistical Estimator: Requirements, Methods of construction, Distributions of statistical estimators; Design of an Experiment and Analysis of Variance; Regression and Correlation Models; Conditional Distribution; Residual Analysis in Linear and Nonlinear Regression; Basic Concepts of Nonparametric Statistics; Location Function and Location Model; Tolerance Limits; Tests Based on Binomial Distribution; Contingency Tables; Nonparametric Methods Based on Ranks; Nonparametric Regression Methods; Statistics of Kolmogorov-Smirnov Type; Tests on Independent Samples.

ENM692 Seminar 3+0 7.5

ENM790 Thesis 0+1 30.0

ENM890 Thesis 0+1 30.0

ENM890-0 Thesis (Thesis Proposal) 0+1 30.0

ENT501 Industrial Design I 3+0 7.5
Scale; Function; Aesthetic; General Design Methods; Project Planning; General Design Strategy of Organization and Relationship Between Policies; Principles and Methods Valid in Plan that Produced for a New Product; Project Applications; Analysis of Design Language in Product Design Processes; Design Challenging Conditions; Interaction Analysis; Cultural Analysis.

ENT502 Industrial Design II 3+0 7.5
Rapid Prototyping Methods and Applications; Formal and Functional Analysis of Potential Trends; Development of Alternative Solutions and Evaluation of Methods Used in Testing Steps; Using High Technology for Product Development end Sample Analysis; Examining Design and Cost Relation.

ENT503 Design Management 3+0 7.5
Establishment of Design Units in Industrial Production; Examining the Designer's Role in this Establishment From Sketch Phase to Prototyping; Management of Design Group; Determining the Design Policy in Company; Comparison of Design Management Processes With Different Production Systems and Different Cultures.

ENT504 Portfolio Presentation Techniques 3+0 7.5
Personalization Methods in Preparation and Presentation of Portfolio; Evaluation of Works By Exchanging Ideas in Group Criticizing Meetings and Proposing New Solution Methods; Interactive CD Or URL Portfolio Works; Modern Portfolio Presentation Techniques.

ENT506 Media and Design 3+0 7.5
Concept of Communication; Theories and Principles of Communication; Communication Methods; Visual and Audio Visual Tools and their Usage; Effects of Visual and Audio Visual Tools; Future of Communication and its Possible Effects on Design; Multimedia and Internet; Communication By Means of Widespread Usage of Intranet and Such Networks and Communicating Feature of Design.

ENT507 Quality in Industrial Design 3+0 7.5
What is Quality?; How Can Quality Can Be Achieved in Design?; Aims and Needs of Off-Line Quality Control Methods; Developing Quality in Design; Quality Function Deployment and Taguchi Method; Reflection of Customer Needs and Requirements to the Design and Customer.

ENT508 Product Identity 3+0 7.5
Defining the Development Process of Product Identity in Industrial Production; Role of the Corporate Identity in the Product Identity; Effects of Cultural Structure and Technological Development on Product Identity; Brand Concept and Creation Process of a Brand.

ENT509 Cultural Problems 3+0 7.5
Definition of Culture; Human and Culture; Affects of Notion of Culture on Design; Definition of Design and Industrial Design as a Cultural Notion; Cultural Problems in Design and Solutions; Intercultural Relationships and Deviations on Design Dimension.

ENT510 New Approaches in Design 3+0 7.5
German Expressionism; New Expressionism; Late Modernism; Pop Culture and Anti-Design, Postmodernism; New Design; Deconstructionist; Kitch; Minimal Design, Design and Emotion; Phenomenological Approach; Conceptual Design.

ENT511 Advanced Computer Aided Manufacturing 3+0 7.5
Applications of Computer Aided Manufacturing; Production Applications of STL Modules; Modeling and Analysis; CNC Machines And Analysis of Production Formats, Computer Aided Applications on Worknc; Molds and Molding Technologies; Real Production of Application Models.

ENT512 Role of Sector in Product Development 2+2 7.5
Product Development Process; Product Planning; Defining Customer Needs; Product Features; Concept Development; Concept Evolution; Concept Testing; Product Architecture; Industrial Design; Design for Manufacturing; Prototyping; Product Development Economics; Procet Management.

ENT513 Creation of Brand and Market Strategies 3+0 7.5
Product Identity Concept in Design; Corporate Identity Concept in Design; Brand Concept: Creating a brand, Presentation of a brand, Brand and target market adaptation, Brand definition; Brand and Product Relation; Marketing Concept; Evaluation of Marketing Methods; Marketing the Brand: Collecting market data, Evaluating market data; Determining Marketing Strategies; Adaptation of Brand and Marketing Strategies; Testing Marketing Strategies: Collecting data, Evaluating data; Modifications on Marketing Strategies According to Gained Information.

ENT514 Theory and Origins of Sustainable Design 3+0 7.5
Historical Evolution of Sustainable Design: Human-environment relations before industrial revolution, 1960-1980 period, 1980-2000 period, 2000 to today; Sustainable Design Approaches: Green design, Ecodesign, Sustainable design, Life cycle assessment, Product service systems; Environmental Criteria; Paradigm Shift for Industrial Design; Social and Ethical Criteria; Perception of Sustainable Design and Risks; Education for Sustainable Design; Research for Sustainable Design.

ENT515 Technical Analysis in Design 3+0 7.5

Technical Analysis Methods, Static Analysis and its Use in Design, Static Analysis Applications at Various Scales, Dynamic Analysis and Vibration, Acoustic Analysis, Acoustic Analysis Applications at Various Scales, Thermal Analysis, Thermal Analysis Applications at Various Scales, Fluid Analysis and Different Applications in Designs, Aerodynamic Analysis, Aerodynamic Analysis Applications at Various Scales.

ENT516 Form and Meaning in Product Design 3+0 7.5

Product Design: Form, meaning and communication; Basic Concepts: Design, industrial design, Form, Communication, Sign, Signifier, Signified, Culture, Codes, Meaning; Basic Theoretical Approaches: Affordance theory, Product semantic theory, Product emotions theory, Sensation and perceptual processes, Cognitive approaches; Research Methods on Perception, Form and Meaning; New Form Development Methodologies.

ENT518 Remote Design Research 3+0 7.5

Fundamentals of interactive research, participatory design paradigm, inclusive design, user-centered research, product design, user experience, research by design, creation of mixed research models, netnography, tools used in remote research, interactive research platforms, data collection in remote research, data analysis in remote research, online research management, privacy in remote research.

ENT519 Advanced Presentation Techniques I 2+2 7.5

First Step of Visualizing the Design; Sketch and Sketch Applications; Sketching Techniques; Black Lead Pencil; Marker; Pastel; Gouache; Colored Pencil; Presentation Posters; Aim; Definition; Dimensions and Poster Samples; 3D Presentation Techniques; Modeling and Prototyping Methods; Modeling Applications; Prototyping and Evaluations.

ENT520 Advanced Presentation Techniques II 2+2 7.5

Personalization Methods in Preparation and Presentation of Portfolio; Evaluation of Works by Exchanging Ideas in Group Criticizing Meetings and Proposing New Solution Methods; Interactive CD Or URL Portfolio Works; Modern Portfolio Presentation Techniques.

ENT521 Computer Aided Design I 2+2 7.5

Pixel and Vector Based Software; Menus and Virtual Tools Used in Two Dimensional Software; Image File Formats: Jpg; Jpeg; Bmp; Psd; Tiff; Tga; Resolution; Creation of Image Files; Determining the Size and Resolution; Processing; Recording; Transferring Images to Virtual Medium; Scanning; Preparing Images for Print; Plot Settings and Plotting.

ENT522 Computer Aided Design II 2+2 7.5

Introduction of the Concept of Designing in a Virtual Medium; Assistant Virtual Tools Used in Fashion Design; Introduction and Using of these Tools; Using the Virtual Tools for Production; Joining Design and Production Processes in Virtual Medium; Introduction and Use of Production Oriented Software; Applications and Evaluations.

ENT523 Visualisation 3+0 7.5

Concept of Visualization: What is visualization, Source, Message, Channel, Target, Feedback, Human factor in visualization; Perception; Signs; Elements of Visualization; Visualization; Tools of Visualization and Usage of Them; Importance of Visualization in Design; Product and User Relations; True Presentation of Product Itself to User; Importance of Visualization in Product and User Interaction; Ergonomics and Visualization.

ENT525 Advanced Computer Aided Industrial Design I 2+2 7.5

CAD/CAM Concepts (Computer Aided Design and Manufacturing Concept), CAID Design Steps and Software, Catia V5 Interface- Catia V5 Basic Structure, Integration Catia, V4-V5, Sketcher Modules, Basics of Geometrical-Dimensional Analysis, Basic of Solid Modeling, Assembly Design, Generative Drafting, Interactive Drafting, Photo-Realistic Render.

ENT526 Advanced Computer Aided Industrial Design II 2+2 7.5

Definition of parametric surfaces in NURBS-MESH concept; Types of 3D images; Ligts and Materials; Selection of Appropriate visualization Methods; Works of Render Images; 3D vector based software Applications; Interactive Visualization in 3D; Generation of interactive 3D images.

ENT527 Automotive Industry and Design 3+0 7.5

Development of Industrial Design in World Automotive Industry: Band system (mass production), Periods of war, Economic crisis; Innovation Trends: New lines, Advances in body and engine technology, End of the unlimited stylism period in the US; Towards the Oil Crisis and Economic Models; Increase in Type of Models and Emergence of New Manufacturers; Development of Automotive Industry in Turkey: First automotive products in Turkey, Import substitution

and first domestic manufacturing, Export-oriented industrialization policies, Search for new design, New investors and manufacturers.

ENT528 Sustainable Design Practice 3+0 7.5
Non-Sustainable Design; Life Cycle of Products: Raw material, Production, Transportation, End of Life; Sustainable Design in Local and Global Context; Local and Global Social Problems and Designer Responsibilities; Design for Social Innovation; Research for Sustainable Design Practice; Ecodesign Practice; Sustainable Design Practice; Guidance Software for Sustainable Design Practice.

ENT529 Ocular Culture and Design Thinking 3+0 7.5
Linear History of Visuality: Image, Techné and causality principles, Methods of record and appearance of image forms; Non-linear History of Visuality: Technique, Technology, Consumption society, Production paradigm, and economics and politics of image; Design Tools and Image: Thinking practice, Mind and representation problem, Abstraction, Meaning, Language, Schema, Form, Geometry, Mechanics, Electronics, Binary representation, Plasticity; Static Meaning and Being: Linear thinking and rhizomatic thinking.

ENT531 Design Research Methods 3+0 7.5
Qualitative research, quantitative research, research paradigms, management in research, interdisciplinary research, research by design, research for design, research about design, mixed research, visualization of research, research presentation, online research methods, design of research tools, design research.

ENT592 Seminar 3+0 7.5

ENT790 Thesis 0+1 30.0

FBE510 Ethics of Science and Research Techniques 2+0 7.5
General Principles of Ethics and Application Fields: Theoretical introduction to ethics, Theory of ethics, Philosophy of ethics of science; Ethics of Scientific Research: Basic principles of scientific ethics, Ethical evaluation in scientific research; Publication Ethics in Production of Information: Description of scientific authorship, Ethics and law, Legal property rights, Reasons, Kinds and prevention of scientific misleading; Research Methods and Techniques: Investigation of research process, Investigation of research methods, Finding required literature about the subject, Obtaining data and evaluation, Methods of report writing.

FBE510-O Ethics of Science and Research Techniques (Online) 2+0 7.5
General Principles of Ethics and Application Fields: Theoretical introduction to ethics, Theory of ethics, Philosophy of ethics of science; Ethics of Scientific Research: Basic principles of scientific ethics, Ethical evaluation in scientific research; Publication Ethics in Production of Information: Description of scientific authorship, Ethics and law, Intellectual property rights, Reasons, Kinds and prevention of scientific misleading; Research Methods and Techniques: Investigation of research process, Investigation of research methods, Finding required literature about the subject, Obtaining data and evaluation, Techniques of report writing.

FBE601 Design, Science and Communication 3+0 7.5
Industrial Revolution in the Middle Ages: Structure of Modern Science; Kepler, Mechanical Science and Philosophy; Research on Design Problems; Concepts of the New Movements; Formation of Modern Science; Organization of Scientific Initiative and Communication; Structure of Scientific Revolutions; Concept of Nature and Modern Life: Inner Logic of Design Thinking; Technique of Replication and Corporations; Design, Communication and Perception.

FİN528 Sport Finance 3+0 7.5
Financial issues in sport; basic financial concepts; financial systems and how they operate; business structure; financial statements; approaches to financial planing; obtaining funding; capital stocks-bonds; capital budgeting; short-term financial management; inventory and production management; taxation and legal issues; spending earnings.

FİZ501 Mathematical Physics 3+0 7.5
Formal Definitions of Vectors; Scalars and Invariants; Orthogonal Transformations; Cartesian Tensors; Vector and Tensor Fields; Generalized Coordinates; General Coordinate Transformations; Gradient; Divergence; Curl and Laplacian in Generalized Coordinates; Formal Properties of Matrices; Eigenvalue Problem; Cayley-Hamilton's Theorem; Functions of Matrices.

FİZ503 Ion Exchange 3+0 7.5

Crystal Systems; Analysis of Crystal Structures; Classification of Crystals According to Their Bound-structures; Metallic Crystals; Ionic Crystals; Covalent Crystals; Molecular Crystals; Packing in a Crystal; Faraday's Laws of Electrolysis; Molar Conductivity; Arrhenius? Theory; Debye-Hückel's Theory; Ionic Mobility; Transportation Coefficients; Ionic Conductivities; Ions in any Solution; Activity Coefficients in Ionic Media.

FİZ505 Physical Adsorption 3+0 7.5

Introduction to Physical Adsorption; Historical; Adsorption Isotherms; Adsorption Forces; Thermodynamics of Adsorption; Adsorbents; Porous and Nonporous Solids of High Surface Area; Classification of Pore Sizes; Micropores, Mesopores and Macropores; External and Internal Surface; Particle Size Distribution; Relationship Between Specific Surface and Particle Size Physical Adsorption of Gases by Nonporous Solids; Type II Isotherm; BET Model; Mathematical Nature of the BET Equation; Application of the BET Equation to Experimental Data; Point B Method; Determining the Molecular area; Step Like Isotherms.

FİZ507 Quantum Mechanics and Molecular Spectroscopy 3+0 7.5

General Formalism of Quantum Mechanics; The Harmonic Oscillator; Angular Momentum in Quantum Mechanics; Spin; Identical Particles Systems; Perturbation Theory; Quantum Mechanics Explanation of Molecular Structure; The Absorption and Emission of Electromagnetic Wave by Molecules; Rotational and Vibrational Spectrum of Two-Atom Molecules; Microwave Spectroscopy; Vibrational Spectroscopy.

FİZ508 Quantum Mechanics 3+0 7.5

Schrödinger Wave Equation; Eigenfunction and Eigenvalues; One Dimensional Potentials; General Formalism of Wave Mechanics; Operators in Quantum Mechanics; N-Particle Systems; The Schrödinger Equation in Three Dimensions; Angular Momentum and Spin; Spherical Symmetric Potential; Approximate Methods and Perturbation Theory; Symmetry and Transformations; Identical Particals; Scattering Theory.

FİZ509 Instrumental Analysis Methods 3+0 7.5

Physical Properties of Matter and Electromagnetic Waves; Absorption Rules; Uv-Vis Spectroscopy; Vibrational Spectroscopy; Infrared Spectroscopy; Raman Spectroscopy; Nuclear Magnetic Resonance Spectroscopy; Mass Spectroscopy; Molecular Spectroscopic Applications.

FİZ510 Evolution of Stars 3+0 7.5

Birth of Stars; Interstellar Environment; Gravitation; Stellar Formation; The Virial Theorem; The Hertzsprung-Russell Diagram; Evolution of Stars on the Main Sequence; Advanced Levels On Stellar Evolution; Evolution of the Sun as the Main Sequence Stars; Evolution of Small, Medium and Massive Stars; Nuclear Reactions on Stars; Hydrogen Flash and red Giant Level; Helium Flash; Carbon Flash; Neon Flash; Oxygen Flash; Silicon; Sulphur and Magnesium Flash; Death of Stars; White Dwarfs; Physical Formation of White Dwarfs; Degenerate Electron Gases; Falling Luminosity and Internal Structure; Collapse of Nuclei and Supernovae Explosion, Classification of Supernovae; Physical Structure of Nebula; Properties of Type II Supernovae Explosions; Properties of Type Supernovae Explosions; Neutron Stars; Binary Pulsar Systems; Observed Rotational Rate Increase; Physical Structure of Neutron Stars; Rotation and Magnetic Fields of Neutron Stars; Pulsars; Neutron Stars Comparison With Pulsars; Producing

FİZ512 High Energy Astrophysics 3+0 7.5

Analysis of Light; Atoms and Sub Atomic Particles; Stimulation and Lonisation; Electromagnetic Spectrum; Radio Astronomy; X-ray and ?-ray astronomy; Ultraviolet and Infrared Astronomy; Neutral Hydrogen and Molecular Line Astronomy, Optical Astronomy; Theoretical Astronomy. Cosmic Ray Physics; Lonisation Loses and Non-relativistic Treatment; Relativistic Case and Lonisation Loses; Lonisation Losses of Electrons; The radiation of accelerated Charged Particles; Bremsstrahlung; Non-relativistic and Thermal Bremsstrahlung; Relativistic Bremsstrahlung. Interactions of High Energy Photons; Photoelectric Absorption; Compton Scattering; Electron Positron Pair Production; Cherenkov Radiation; Electron-Pasitron Annihilation and Positron Production Mechanism. Nuclear Interactions; High Energy Protons; Cosmic Ray Nuclei; Nuclear Emission Lines; Cosmic Rays in Atmosphere. Detectors For High Energy Particles; X-ray and ?-rays; Study of High Energy Particles; Gas-Filled Detectors-Proportional Counter

FİZ514 Electromagnetic Wave Theory 3+0 7.5

Complex Vectors; Complex Algebra; Complex Representation of Time-Harmonic Scalars; Real Vectors; Complex Vectors; Time Averages; Maxwell Equations; Maxwell Equations for Time-Harmonic Fields; Lorentz Force Law; Poynting's Theorem; Uniform Plane Waves; Uniform Plane Waves in Free Space; Polarization; Plane Waves in Dissipative Media; Reflection and Transmission of Waves; Boundary Conditions; Reflection and Transmission at a Dielectric Interface; Reflection by Perfectly Conducting Planes.

FİZ515 Analysis of the X-ray Spectrum 3+0 7.5

X-Rays; The Properties of the X-Rays; Production of the X-Rays; Continuous Spectrum; Characteristic Spectrum; Crystalline Structures; Directions and Planes in the Lattice; Diffraction Theory; Bragg's Law; Directions of the Diffraction; Diffraction Methods; Diffraction by the Atoms; Diffraction by the Electrons; Diffraction by the Unit Cells; Calculations of the Intensities; Experimental Methods in X-Ray Diffraction; Laue Method; Rotating Crystal Method; Powder Method; The Use of Diffraction Pattern.

FİZ522 Geometric Algebra and Applications 3+0 7.5

Vectors, Compleks Numbers and Matrics: Pauli Spin Matrices and Spinors; Geometric Algebra and Applications: Subspaces, Bivectors, Three-vectors, Quaternions, Multi-vectors, Inner, Outer and Geometric Product, Matrics Representation of Cl2 and Cl3; Algebric Operations in Geometric Algebra: The Rank and Inverse of Multi-vector, Pseudoscalar, The Dual of Multi-vector, The Projection and Perependicular Component of Multi-vector; Reflection Operations in Geometric Algebra: Reflection Operations in Euclidian Plane, Reflection Operations in Euclidian Space; The Rotation Operations in Geometric Algebra: Rotation Operations in Euclidian Plane, Rotation Operations in Euclidian Space; Geometric Algebra Applicatioan in Physics: Mechanic, Electromagnetism, Quantum, Molecular Physics.

FİZ523 Optoelectronic Physics I 3+0 7.5

Quantum Mechanics and Statistical physics of Electrons; Classical description of physics, Quantum description of physics, The Schrödinger equation for electrons, The free electron problem, Filling of electronic states: statistics, Scattering of electrons, Electrons In Crystals: Semiconductor Bandstructure; The challenge of solid state electronics, Periodicity of a crystal ,Basic lattice types, Electrons in a periodic potential, Metals, Semiconductors, and İNŞulators, Holes in semiconductors, Bandstructures of some semiconductors, Modification of bandstructure, Doping Of Semiconductors; IntrİNŞic carrier concentration, Dopping: donors and acceptors, Carriers in doped semiconductors, Modulation doping, Transport And Optical Properties In Semiconductors; Scattering in semiconductors, Velocity-Elelectric field relations, Very high field transport: breakdown, Carrier transport by diffusion, Transport by drift and diffusion, Optical properties of semiconductors, Charge injection and quasi-f

FİZ524 Optoelectronic Physics II 3+0 7.5

Junctions In Semiconductors: P-N Diodes; Device demands, The unbiased p-n junction, P-N junction under bias, The real diode: consequences of defect, High voltage effects in diodes, Modulation and switching: ac response, Application of diodes, Semiconductor Junction With Metals And Insulators; Metals as a conductors: interconnects, The Schottky barrier diode, Ohmic contacts, Insulator-semiconductor junctions, Application and technology issues, Optoelectronic Devices.

FİZ525 Some Biophysical Techniques Connected With Waves 3+0 7.5

Microscope and Some Special Microscope Techniques, Light Microscope, Compound Microscope, Immersion Microscope, Acoustic Microscope, UV Microscope, Polarization Microscope; Electron Microscope, Electron Waves, Electrostatics Lens, Magnetic Lens; X-Rays and Applications, X-Rays Spectrum, Absorption of X-Rays, X-Rays Diffraction; Ultrasound and Applications, Absorption of Sound, Acoustic Impedance; Holography; NMR and Applications, Resonance Principles, Fundamental Concepts, Spin Magnetic Moment of Electron; Doppler and Applications.

FİZ526 Classical Mechanics 3+0 7.5

Kinematics of a Particle; D'alambert Principle and Lagrange's Equations; Simple Applications of Lagrange Formulations; Calculus of Variations; Hamilton's Principle; Symmetry Properties of Conservation Theorems; Two-Body Central Force Problem; Vrial Theorem; Kepler's Problem; Rigid Body Kinematics; Euler's Angles; Euler's Equations.

FİZ527 Advanced Statistical Physics 3+0 7.5

Main Principles of Statistical Physics: Statistical distribution, Statistical independence, Liouville theorem, Statistical matrix, Distribution in quantum statistics, Energy, Entrophy, Permanent increment principle of entrophy; Termodinamic Magnitudes: Temprature, Pressure, Work and heat amount, Heat function, Free energy and termodinamic potential, Adyobatic process and the process of Jule-Thompson; Gibbs Distribution: Gibbs and Maxwell distributions, Free energy and Gibbs distribution, Termodinamic perturbation theory, Gibbs distribution of system with variable number of particles, Finding out termodinamic rules from Gibbs distribution; Theory Of Ideal Gas: Boltzman distribution, Unbalanced ideal gas, Monoatomic gas, Twoatomic gas, and polyatomic gas; Fermi And Bose Distribution: Fermi distribution, Bose distribution, Degenerated electronic gas, Degenerated Bose gas, Radiation of black substance; Non-Ideal Gas: Serial development according to the density, Formula of Van Der Waals, Totally ionizated gas; Balance Circumstances of Phase: Critical points, Properties of substances close to the critical points; Fluctuation: Gauss distribution, Fluctuations of termodinamic magnitudes, Fluctuations in ideal gas, Formula of Poisson.

FİZ528 Adsorption Technology 3+0 7.5

Adsorption as a process; Basic Concepts, Regeneration, Practical Guidelines, Moving Bed, Experimental Design and Testing, Adsorption Forces, Porosity, Surface Function Groups, Isostere, Isobar, Classification of Adsorption Isotherms:

Equilibrium Models, Single Component Adsorption, Multi Component Adsorption, Adsorption Kinetics: External Diffusion, Internal Diffusion, Diffusion Model; Surface Diffusion Model, Combined Diffusion Model Concept of Differential Reactor; Theoretical Considerations, Materials, Equilibrium Studies, Kinetic Studies, Conclusions.

FİZ529 Thin Film Characterization 3+0 7.5

Importance of Materials Characterization; Techniques of Structural Characterization: X-ray analysis, Texture coefficient, Grain size, Morphological analysis, Determination of thickness; Optical Characterization of Materials: Optical properties, Optic band gap, Determination of direct and indirect band gap; Optical Constants: Some dispersion relations, Refractive index, Extinction coefficient, Absorption coefficient, Transmission, Reflection, Optical conductivity, Complex dielectric function; Electrical Characterization of Materials: Resistivity measurement techniques, Conductivity type measurement techniques, Hall and magnetoresistivity mobility measurement techniques.

FİZ530 Thin Film Technology 3+0 7.5

The Preparation Methods of Thin Films; Vacuum Technology: Kinetic theory of gases, Gas transport and pumping, Vacuum pumps, Vacuum systems, The role of the vacuum in the thin film technology; Evaporation Processes: The physics and chemistry of evaporation, Evaporation processes and applications; Chemical Vapor Deposition (CVD): Thermodynamics of CVD, Thermal CVD processes; Sputter Deposition Processes: Sputter sources, Sputter coating systems; Sol-Gel Coatings: The sol-gel process; Spray Pyroysis Method.

FİZ531 Amorphous Material Physics 3+0 7.5

Theory of Electronic States in Amorphous Materials: Theoretical methods, The density of states, Anderson localization; Amorphous Materials: Definition of amorphous materials, Amorphous metals, Liquid metals and semi-metals, Amorphous semiconductors, Amorphous germanium and silicon, Alloys, Glassy materials, Ceramics; Amorphous Material Physics: Structural properties, Optical properties, Optical band gap, Electrical properties.

FİZ532 Particle Physics 3+0 7.5

Discoveries of Particles; Classification of Particles and Their Interactions; Introduction to Quantum Electrodynamics; The Feynman rules for QED; Parton model; Quantum Chromodynamics; Weak Interactions of Leptons and Quarks; Electroweak Unification; Introduction to Gauge Theories.

FİZ533 Special Function in Physics I 3+0 7.5

Differential Equations in Physics; Solutions of the Equations Using Separation of Variables and Green's Function; Sturm-Liouville Theory; Legendre Polynomials; Associated Legendre Polynomials; Laguerre Polynomials; Hermite Polynomials; Bessel Functions; Hypergeometric Functions; Physical Applications.

FİZ537 Fundamentals of Impedance Spectroscopy 3+0 7.5

Basic Definitions, and History; The Importance of Interfaces, Impedance-Related Functions, History, Elementary Analysis of Impedance Spectra; Physical Models for Equivalent Circuit Elements, Simple RC Circuits, Selected Applications of IS; The Electrical Analogs of Physical and Chemical Processes; The Electrical Properties of Bulk Homogeneous Phases, Mass and Charge Transport, Interfaces and Boundary Conditions, Grain Boundary Effects, Current Distribution, Porous and Rough Electrodes, Physical and Electrochemical Models; The Modeling of Electrochemical Systems, Equivalent Circuits, Modeling Results.

FİZ538 Special Functions in Physics II 3+0 7.5

Partial Differential Equations in Physics; First Order and Second Order Partial Diferantial Equations; Heat Equations; Wave Equations; Green?s Functions; Time Independent And Time Dependent Green?s Functions; Solutions of the Differential Equations by Separation of Variables and Green?s Function Technique; Integral Equations; Fredholm and Volterra Type Integral Equations; Calculus of Variations.

FİZ539 Dynamics and Relativity 3+0 7.5

Galilean Relativity, Conservation Laws In Physics; Central Forces? Problems; Mechanical Vibrations and Waves; Systems of n Particles; Solid Body Motion; Rotation and translation, Collisions; Problems in physics, Scattering of Particles and Applications; Special Relativity; Space-Time Geometry; 4-vectoral operations, Relativistic Dynamics; General Relativity, Principle of equivalence, Curved space.

FİZ540 Characterization of Solids 3+0 7.5

Electromagnetic spectrum, Interaction with material, Structural analysis with x-ray diffraction spectroscopy, Electrical characterization, Surface analysis with scanning electron microscope, Structural analysis with transition electron microscope, Photoluminescence, Electroluminescence, Magnetoresistance, IR, Raman.

FİZ541 Semiconductors 3+0 7.5

Crystal Structure of Solids and Energy Bands; Semiconductor Materials and Their Properties; Doping of Semiconductors; Carrier Transport in Semiconductors; Generation and Recombination of Carriers; Direct and Indirect Band Transitions; Photoconductivity; The p-n Junctions; Solar Cells.

FİZ542 Electromagnetic Theory 3+0 7.5

Boundary Value Problems in Electrostatics; Multipole Expansions; Electrostatics Problems in Dielectric Media; Boundary Value Problems in Magnetostatics; Maxwell Equations; Poynting Theorem; Conservation of Energy and Momentum.

FİZ543 Condensed Matter Physics I 3+0 7.5

Phonons and Lattice Dynamics, Electrons in solids, Electron-Phonon Interactions, Electron-Electron and Electron-Lattice Impurity Interactions, Transport Theory, Plasmons, Polaritons and polarons.

FİZ544 Condensed Matter Physics II 3+0 7.5

Classification of materials, Introduction to magnetic materials, Magnetic susceptibility, Langevin diamagnetism, Paramagnetism, Ferromagnetism, Antiferromagnetism and ferrimagnetism, Measurement techniques for magnetic properties.

FİZ545 Characterization Methods of Porous Solids and Powder Minerals 3+0 7.5

Gas Adsorption: Physisorption of gases by clays and zeolites, Energetics of physisorption, Interpretation and classification of physisorption-isotherms, Vacuum Volumetric Measurement (Manometry): Calibration of sample cells, Outgassing the adsorbent sample, Adsorption equilibrium, Temperature, Pressure, Volumetric sorption analyzer instruments (Autosorb-1C and Nova concepts), Determination of surface area from Langmuir and BET theories, Thermal Properties of Clays and Zeolites: Volumetric and structural changes on dehydration, TGA/DTA/DSC applications, Chemical (XRF) and Structural (XRD) Properties of Clays and Zeolites.

FİZ546 Infrared Detection Systems: Physics and Technology 3+0 7.5

Electromagnetic spectrum and infrared radiation: Atmospheric transmission and windows; Radiometry: Planck?s Law; Black body radiation; Solid angle, radiance, emissivity; Optical detection processes; Thermal detectors: Bolometers; Pyroelectric detectors; Thermoelectric detectors; Photon detectors: MCT photodiodes; Schottky barrier photodetectors; Hetero-junction internal photoemission detectors; Blocked impurity band detectors; Homo-junction internal photoemission detectors; Quantum well and quantum dot photodetectors; Type-IIsuperlattice photodetectors; Detector parameters: Responsivity, noise, signal-to-noise ratio, noise equivalent power;

FİZ547 Lab VIEW: Graphical Programming Language 3+0 7.5

Introduction to graphical programming language LabVIEW; Front panel; Block diagrams; Working with virtual instruments and error correction; Virtual instruments and sub-virtual instruments: Loops; Structures; Sequences; Graphs; Data collection; Analysis and presentation.

FİZ549 Hypercomplex Numbers in Physics 3+0 7.5

Hypercomplex Numbers and Their Basic Properties: Complex numbers, Split-complex numbers, Dual numbers, Basic operations, Matrix representations of hypercomplex numbers, Hyperbolic numbers in physical applications; Quaternions and Their Physical Applications: Real, Complex, Dual, Hyperbolic and split quaternions, Basic operations, Matrix representations of quaternions, Quaternionic representation of physical quantities; Octonions and Their Physical Applications: Real, Split and hyperbolic octonions, Basic operations, Matrix representations, Octonionic representation of physical quantities; Sedenions: Definition, Basic operations, Sedenions in physical applications.

FİZ550 Geometry and Topology in Physics 3+0 7.5

Vector Spaces; Topological Spaces; Differentiable Manifolds; Vectors and Tensors on a Manifold; Lie Derivatives; Exterior Forms; Exterior Derivatives; Inner Product Operators; Riemannian and non-Riemannian Geometries; Metric Tensor; Metric Compatibility; Connections; Riemann Tensor; Ricci Tensor; Torsion; Levi-Civita Connection; Connection with Torsion; Covariant Derivatives; Cartan Structure Equations; Bianchi Identities; Hodge Operator; Applications in Physics.

FİZ551 Plasma Physics 3+0 7.5

Introduction: Occurrence of plasmas in nature, Definition of plasma, Concept of temperature, Debye shielding, Plasma parameters, Criteria for plasmas, Applications of plasma physics; Single-Particle Motions; Plasmas As Fluids: Introduction, Relation of plasma physics to ordinary electromagnetics; Waves in Plasma: Representations of waves, Plasma oscillations; Kinetic Theory: Equations of kinetic theory; Sheaths.

FİZ552 (Eng) Quantum Physics 3+0 7.5

Origins of Quantum Physics, Blackbody radiation and photoelectric effect, X Rays, Compton scattering, Atomic spectra, Bohr atom - quantization of energy; Particle-Wave Mechanics; Schrödinger Equation, Particle in a box and standing waves, Finite square well, Expectation values of classical observables, Quantum theory of atoms, Hydrogen atom, Spin and magnetic moments - Stern-Gerlach, Angular momenta and spin addition rules - Spin-Orbit, Molecules; Solids, Crystal structure, Free electron vs. fermi gas theory of electrical properties, Band theory of solids and semiconductors.

FİZ553 Molecular Modelling 3+0 7.5

Basic concepts in molecular modelling; Molecular mechanical models; Hartree Fock method; Basis sets; Semi-empirical methods; Structural geometric optimizations; Density functional theory and its applications; Vibrational frequencies; Determination of scaling factors; Applications of GaussView program; Applications of Gaussian program; Comparison of theoretical and experimental data for sample molecules.

FİZ554 Surfactants in Aqueous Solutions 3+0 7.5

Introduction to Surface Active Agents (Surfactants); Properties of Surfactants; Classification of Surfactants: Cationic, Anionic and nonionic surfactants; Ecological Effects of Surfactants; Micelle Formation: Critical micelle concentration, Hydrophobic and hydrophilic groups, Effects of parameters such as pH and Temperature in micelle formation; Phase Behaviors of Surfactant Systems; Colloidal Forces; Adsorption of Surfactants on Interfaces; Cationic Surfactant Adsorption on Clays: Organoclays.

FİZ556 Experimental Techniques in Particle Physics 3+0 7.5

Passage of Radiation Through Matter: Ionization, Multiple scattering, Cherenkov radiation; Ionization Detectors: Multiwire proportional chambers, Drift chambers, Time projection chambers; Scintillators; Photomultiplier Tubes; Semiconductor Detectors; Photographic Emulsions; Detector Design and Sub-detectors: Trackers, Calorimeters, Spectrometers; Triggers; Statistics and the Treatment of Experimental Data: Probability Distributions, Measurement errors, Parameter estimation, Hypothesis testing; Detector Simulations; Particle Accelerator Concepts.

FİZ557 Radiation Physics 3+0 7.5

X-ray generation, continuous and characteristic X-ray spectra; Interaction of heavy charged particles with matter; Interaction of electrons with matter; Interaction of photons with matter; Methods of radiation detection: Ionization in gases, ionization current, ionization pulses; Methods of radiation detection gas-filled detectors: ionization chamber, proportional counter, Geiger-Müller counter; Band theory of solids, semiconductors, p-n junctions; Semiconductor detectors; Scintillation, scintillation in organic scintillators, scintillation detectors; Thermoluminescence dosimeters, chemical dosimeters, calorimetry, neutron detectors.

FİZ592 Seminar 3+0 7.5

FİZ601 Clay and Clay Minerals I 3+0 7.5

Definitions; Factors Controlling the Properties of Clay Materials; Clay-Mineral Composition; Nonclay-Mineral Composition; Classification and Nomenclature of Clay Minerals; Structures of Clay Minerals; Kaolinite Minerals; Halloysite Minerals; Montmorillonite Minerals; Definition of Structures By X-Ray Diffraction; Electron Microscope.

FİZ602 Clay and Clay Minerals II 3+0 7.5

Ion Exchange Through Clays; Cation-Exchange Capacity, Causes of Cation Exchange; Theory of Cation Exchange; The Nature of Water Adsorbed by Clays; Clay-Water System; Heat of Wetting; Time Factor; Definition of Specific Surface Area in Clays; Hydration and Dehydration Through Clays; Dehydration Curves; Differential Thermal Analysis.

FİZ604 Selected Topics in Zeolite Molecular Sieves 3+0 7.5

Physical Properties of Zeolite Crystals; Optical Properties; Dielectric Properties; Electrical Properties; Thermochemistry; Zeolite Water; Ionchange Reactions in Zeolites; Ion Exchange Theory; Hydrogen Exchange in Zeolites; Cation Sieve Effects in Zeolites; Adsorption on Zeolites; Heat of Adsorption; Character of the Adsorbed Phase in Zeolites; Adsorption Separation of Gas Mixtures.

FİZ605 Selected Topics on Clay and Clay Minerals I 3+0 7.5

The Properties and the Structures of Clay and Clay Minerals; Structure and Composition; Clay-water Systems; Miscellaneous Properties; Clays in Ceramic Industry; Plasticity; Drying Properties; Firing Properties; Clays in Petroleum Industry; Search for Petroleum; Producing Operations; Investigation of Usability on Various Branches of Industry.

FİZ606 Selected Topics in Electromagnetic Wave Theory 3+0 7.5

Waveguides and Resonators; Paralel-Plate Waveguides; Rectangular Waveguides and Resonators; Dielectric Slab Waveguides; Coaxial Lines; Transmission Lines; Transmission-Line Equations; Impedances; Generalized Reflection Coefficient and Smith Chart; Antennas; Vector and Scalar Potential Functions; Fields of Antennas; Linear Antennas; Rayleigh Scattering; Fourier Optics and Hollography; Doppler Effect; Plane Waves in Anisotropic Media.

FİZ607 Optical Properties of Semiconductors I 3+0 7.5

Energy States in Semiconductors; Band Structure; Impurity States; Band Tailing; Excitons; Donor-Acceptor Pairs; Perturbation of Semiconductors by External Parameters; Pressure Effects; Temperature Effects; Electric Field Effects; Magnetic Field Effects; Absorption; Fundamental Absorption; Higher Energy Transitions; Exciton Absorption; Transitions Between a Band and an Impurity Level; Intraband Transitions; Free Carrier Absorption; Hot-Electron-Assisted Absorption.

FİZ608 Optical Properties of Semiconductors II 3+0 7.5

Relationship Between Optical Constants; Absorption Coefficient; Index of Refraction; Kramers-Kronig Relations; Reflection coefficients; Absorption Spectroscopy; Radiative Transitions; Van Roosbroeck-Shockley Relation; Radiative Efficiency; Fundamental Transitions; Transitions Between a Band and an Impurity Level; Donor-Acceptor Transitions; Intraband Transitions; Nonradiative Recombination; Auger Effect; Surface Recombination.

FİZ610 Selected Topics on Clay and Clay Minerals II 3+0 7.5

Dielectric Properties of Clays; Variation Of Permitivity Versus Humidity; Frequency of Electric Field; Cole-Cole Diagrams; Various Physicochemical Properties of Clays; Adsorption-Desorption Properties; Ion Exchange Properties; Effects of Various Factors on Adsorption Properties of Clays.

FİZ611 Selected Topics in Solid State Physics 3+0 7.5

Metal-Semiconductor Contacts; Energy-Band Relation; Surface States; Current Transport Mechanisms; Thermionic Emission Theory; Diffusion Theory; Tunneling Current; Characterization of Potential Barrier; Current-Voltage Measurement; Activation Energy Measurement; Capacitance-Voltage Measurement; Photoelectric Measurement; Barrier Height Adjustment; Ohmic Contact.

FİZ612 Dielectric Physics 3+0 7.5

Behavior of Dielectrics in Static Electric Fields; Electric Susceptibility and Permittivity; Dielectric Polarization; Polarization Vector and Molecular Quantities; Clausius-Mosotti's Equation and Lorenz's Local Field; Dipole Moments in Solutions; Mosotti's Catastroph; Onsager's Local Field; Electric Susceptibility of Dipolar Gases; Dielectric Theories of Kirkwood and Fröchlich; Behavior of Dielectrics in Alternative Electric Fields; Dielectric Polarization in Alternative Electric Fields; Debye's Absorption and Dipolar Dispersion; Cole-Cole's Diagram; Cole-Cole's Equation; Cole-Davidson's Equation; Kramer-Kronig's Equations.

FİZ614 Selected Topics in Classical Mechanics 3+0 7.5

Legendre Transformations and Hamilton Equations of Motion; Conservation Theorems and Physical Meaning of Hamilton's Equations; Some Applications of Hamilton's Equations; Canonical Transformations; Hamilton-Jacobi Theory; Vibrating Systems; Diatomic Molecule.

FİZ616 Group Theory and Applications to Physics 3+0 7.5

Symmetry Elements and Operations; Point Groups; Non-Degenerate Representations; Matrices; Degenerate Representations; Applications to Molecular Bonding; Applications to Molecular Vibration.

FİZ617 Lie Groups and Physical Applications 3+0 7.5

Basic Structure Blocks; Set; Group; Symmetry Operations; Symmetry Operations and Group; Extra Definitions; Subgroups; Classes; Matrices; Matrices and Symmetry Operations of Square; Matrix Representations of a Group; Field; Linear Vector Spaces; Algebra; Bases; For a Group; For Field; For a Vector Space; For An Algebra; Isomorphism; Homomorphism; Irreducible and Reducible Matrix Representations; Discrete Groups; Orthogonal Groups; O+3; Orthogonal Transformation and Orthogonal Group; Physical Applications; Lie Group U(n) and SU(n) Groups; U(n) and SU(n) Generators; SU(2) and SU(3) Generators; Rotation and Angular Momentum; Linear Representations of A Lie Group; Quantum Mechanics and Group Theory; Physical Applications.

FİZ619 Conduction Mechanisms in Solids 3+0 7.5

Basic Concepts Related to Electrical Conduction; Energy Band Model; Tunneling Model; Hopping Model; Electrical Properties; Formation of Traps; Charge Carrier Injection from Contacts; Electrical Contacts; Types of Electrical Contacts; Charge Carrier Injection through Potential Barriers from Contacts; Conduction Mechanisms in Solids; Ionic Conduction;

Tunnel or Field Emission; Ohmic Conduction; Space Charge Limited Conduction; Poole-Frenkel Emission; Schottky Emission.

FİZ621 Selected Topics in Adsorption Technology 3+0 7.5

Gravimetric Differential Reactor for Adsorption Studies; Experimental Results and Discussion, Materials, Equilibrium Isotherm, Kinetic Studies, gravimetric Differential Reactor for Water Adsorption Studies; Experimental Results, Experimental Procedure, Equilibrium, Kinetic Analysis, Combined Diffusion Differential Reactor Models; Liquid-Solid Systems, Gas-Solid Systems, Ds-Dp Determination, Thermodynamics Analysis of Adsorption Systems: Methods and Models, Experimental Procedure, Method of Approach.

FİZ622 Selected Topics of Advanced Statistical Physics 3+0 7.5

Solids: Solids at low temperatures, Solid at high temperatures, Debye's interpolation formula, Thermal expansion of solids, Phonons, Quantum liquid, Bose spectrum, Super influent, Fermi spectrum, The electron spectrum of metals, The electron spectrum of solid insulators, Phonon creation and annihilation operators, Negative temperatures; Non-ideal gases: Deviation of gases from the ideal state, Expansion in powers of the density, Van der Waals? formula, Completely ionized gases, Degenerated Bose gas, Degenerated Fermi gas, Thermodynamic quantities for a degenerate plasma; Phase Equilibrium: Conditions of phase equilibrium, The Clapeyron-Clausius formula, The critical point, The law of corresponding states; Solutions: Systems containing different particles, The phase rule, Weak solutions, Osmotic pressure, Mixtures of ideal gases, Mixtures of isotopes, Gases and liquids; Fluctuations: The Gaussian distribution, The Gaussian distribution for more than one variable, Fluctuations of the fun

FİZ623 Selected Topics in Mathematical Physics 3+0 7.5

Fourier Series; Average Value of a Function Complex Form of Fourier Series; Parseval Theorem; Power; Root; Logarithm and Trigonometric Functions of a Complex Number; Integral Transformations; Laplace and Fourier Integral Transformations; Gamma; Beta and Error Functions; Eliptic Integrals and Functions; Quaternions.

FİZ624 Selected Topics in Semiconductors 3+0 7.5

Quantum Theory of Electrons in Periodic Lattices; Bloch theorem; Kronig-Penney Model; Crystal Momentum and Effective Mass; Electrons and Holes; Free-Electron Approximation; Tight-Binding Approximation; Constant Energy Surfaces and Brillouin Zones; Insulators; Semiconductors and Metals; Uniform Semiconductors in Equilibrium; IntrİNŞic and Impurity in Semiconductors; Statistics of Electrons and Holes; Ionization Energy of Impurity Centers; Conductivity; Hall Effect and Magnetoresistance; Ellipsoidal Energy Surfaces; Excess Carriers in Semiconductors; Continuity Equation; Drift Mobility and Haynes-Shockley Experiment; Recombination Mechanisms.

FİZ627 Selected Topics in Ion Exchange 3+0 7.5

Ion Exchange Procedures: Batch Operation; Column Process; Continuous Process; Types of Ion Exchangers; Synthetic; Natural; Cellulose; Ion Exchangers; Active Coals; Ion Exchange Membrans and Liquid Ion Exchangers; Properties of Ion Exchangers; Humidity Content and Density; Particle Size; Cross-Linking; Porosity; Swelling; Ion Exchange Capacity; Selectivity; Application Fields of Ion Exchangers.

FİZ629 Electromagnetic Wave Theory 3+0 7.5

Spin: The spin operator, Spinors, The wave functions of particle with arbitrary spin; Identity of particles: The principle of indistinguishability of similar particles, Exchange interaction, Symmetry with respect to interchange, Second quantization (the case of Bose statistics), Second quantization (the case of Fermi statistics); Addition of angular momentum: 3j-sembols, Calculation of matrix elements of tensors, 6j-sembols; The theory of elastic collisions: The general theory of scattering, The unitary condition for scattering, Born?s formula, The quasi-classical case, Scattering at high energies, The scattering of slow particles, Resonance scattering at low energies; Inelastic collisions: Elastic scattering in the presence of inelastic processes, Inelastic scattering of slow particles, Breit and Wigner?s formulae, Inelastic collisions between fast electrons and atoms, Scattering from the molecules.

FİZ630 Magnetic Properties of Solids 3+0 7.5

Landau quantization and de Haas Alphen Effect, Integer quantum Hall Effect (IQHE), Fractional Quantum Hall Effect (FQHE), Geometric Magnotoresistance (GMR), Magnetic Anisotropy, Magnetostriction.

FİZ631 Organic Semiconductor Physics 3+0 7.5

Introduction to the physics of organic semiconductor, Organic materials, Organic semiconductors and electronic properties of interfaces between organic semiconductors and metals, Electrical conductivity mechanism in organic semiconductors, Optical properties of organic semiconductors, Organic thin film transistors, Organic light emitted diodes, Organic solar cells.

FİZ632 Classical Electrodynamics 3+0 7.5

Electromagnetic Waves in Conducting and Non-conducting Media; Wave Guides; Multipole Radiation; Electromagnetism and Special Theory of Relativity; Motion of Charged Particles in Electromagnetic Field; Radiation from Moving Charges.

FİZ633 Band Theory in Semiconductors 3+0 7.5

Group theory and character tables for band theory, Effective mass theory, Plane wave approximation at band theory, K.p method, Pseudo-potential method.

FİZ634 Gravitation and Cosmology 3+0 7.5

Concept of Absolute Space-time; Special Theory of Relativity; Minkowski Space-time; Lorentz Transformations; Geometric Structures in Gravitation; Connection Structure and Curvature; General Theory of Relativity; Einstein Field Equations; Derivation of Field Equations by Variation Principle; Generalized Theories of Gravitation; Theories of Gravitation with a Scalar Field; Schwarzschild Solutions.

FİZ635 Ultra Cold Atomic Gases 3+0 7.5

The non-interacting Bose Gas; The Weakly Interacting Bose Gas; Atomic Properties; Trapping and Cooling of Atom; The Magneto Otical Trap; Interactions Between Atoms; Basic Scattering Theory; Theory of the Condensed State; Ground State of a Trapped Condensates; Energy, Chemical Potential and Virial Theorem; TF Approximation; Density and Momentum Distribution; Attractive Potential; Dynamics of the Condensate; Release of Trap and Expansion of The Gas; Solitons; Microscopic Theory of the Bose Gas; Excitation in a Trapped Gas; Interference and the Josephson Effect; The Bose Einstein Condensation in Optical Lattice; The Bose Einstein Condensation in Low Dimension; Rotating Condensates; Quantized Vortices; Superfluidty; Quantum Hydrodynamics; ; Trapped Clouds at nonzero Temperatures; Mixtures and Spinor Condensates, Fermionic Condensates, The BCS Transition

FİZ636 Molecular Beam Epitaxy: Instrument and Application 3+0 7.5

Components of molecular beam epitaxy (MBE) instrument: Vacuum chamber; Vacuum pumps; Effusion cells; Reflection high energy electron diffraction (RHEED) technique: Operation and applications; Temperature readers; Residual gas analyzer (RGA); Epitaxial film deposition parameters: Material flux measurements; Growth parameters calibration; Application and usage areas of epitaxial films

FİZ637 Fundamental Properties and Gas Adsorption Applications of Naturel Adsorbents 3+0 7.5

Fundamental factors in designing adsorbents: Potential energy of adsorption; Heat of adsorption; Effects of adsorbate properties on adsorption (Polarizability (?); Dipol moment (μ) and quadrupole moment (Q)); Basic considerations for sorbent design: Polarizability (?); Electronic charge (q) and van der Waals radius (r); pore size and geometry; Investigation of adsorption behavior on natural zeolites: Structure and cations sites of natural zeolites; Natural zeolites and Molecular Sieving Properties; Unique adsorption properties of natural zeolites; Interactions of adsorbate with cation site; charge and ionic radius; Adsorption applications of various gases on natural zeolites

FİZ638 Fundamentals of Semiconductor Device and Technology 3+0 7.5

Semiconductors: Fundamentals, doped-undoped structures; Fermi level; Electron and hole densities; Devices and operation basics: P-n junction; metal-oxide semiconductors (MOS); Bipolar junction transistors (BJT); Metal-oxide semiconductor field effect transistors (MOSFET); Elements of quantum mechanics: Black body radiation and atom models; Wave-particle duality; Basic formalism and Schrödinger equation; Particle in a box and quantum mechanical confinement; Energy-band theory: Kronig-Penney model; Particle motion and effective mass; E-k diagrams; Semiconductor hetero- and multi-junctions; Structures with quantum wells: Quantum wells; Calculations of the conduction bandenergy levels; Intersubband transitions; Design details of quantum well; ınfrared Quantum wire and quantum dot structures;

FİZ639 Physical Mechanisms of Variables Stars 3+0 7.5

Types and Physical Properties of Variable Stars; Orbital Cycle: White dwarf and red dwarf, Keplerian motion; Ellipsoidal Variations; Mass Transfer; Bright Spot; Spectral Characteristics; Emission and Absorption Lines; Disc spectrums; Eclipse Mapping; Physical Properties of Interaction Mechanisms: Accretion disc models, Siphons, Winds, Streams, Flickering, Oscillations.

FİZ640 Structural Properties of Accretion Disc in Binary Stars 3+0 7.5

Accretion as a Source of Energy: The Eddington limit, The emitted spectrum, Accretion theory and observation; Accretion in Binary Systems: Interacting binary systems, Roche Lobe overflow, Roche geometry and binary evolution; Disc Formation; Accretion Discs: Radial disc structure, Steady thin discs, Dwarf novae; Accretion onto Compact Objects: Boundary layers, Accretion columns; Thick Discs: Limiting luminosity, Dynamical stability; Accretion flows: Astrophysical applications.

FİZ641 Gas Adsorption Applications of Clay Type Naturel Adsorbents 3+0 7.5

Gas Adsorption by Clays: Structural features of layer silicates, Silicates with two-layer sheets and silicates with three-layer (Kaolinite, smectites and sepiolite), Physisorption of gases by kaolinite, Physisorption of gases by smectites: Adsorption of non-polar molecules and adsorption of polar molecules, Adsorption applications of various gases on clays.

FİZ642 Infrared and Raman Spectroscopy 3+0 7.5

Electromagnetic Wave and Matter Interaction; Molecular Vibrations; Vibration of Diatomic Molecules: Vibrational spectra of diatomic molecules, Rotational spectra of diatomic molecules; Infrared Spectroscopy: Basic concepts in infrared spectroscopy, Modes of vibration, Infrared spectrometer, Methods of infrared spectrum, Analysis of molecular structure by infrared spectroscopy; Raman Spectroscopy: Classical and quantum theory, Raman spectrometer, Methods of Raman spectrum, Analysis of molecular structure by Raman spectroscopy.

FİZ643 Matrix Isolation Techniques and Applications 3+0 7.5

Introduction to the Matrix Isolation Technique: Setting up a matrix isolation laboratory; Basic procedures for matrix preparation; Matrix Isolation Infrared Spectroscopy: Molecular conformational studies with matrix isolation infrared spectroscopy; Hot Vibrational Conformational Processes of Matrix-Isolated Molecules Induced by NIR-Laser Light; UV-Induced Photochemistry and Photoisomerization of Matrix-Isolated Molecules: Practical Examples.

FİZ644 Nuclear Magnetic Resonance Spectroscopy 3+0 7.5

Introduction to NMR Spectroscopy and Resonance; Definition of Chemical Shift; Investigation of Spin-spin Interactions; Investigation of Proton-proton Interactions; Dynamic NMR Spectroscopy; 13C NMR Spectroscopy; Pulsed NMR Spectroscopy; 13C NMR and Chemical Shifts; Multi Pulsed NMR Experiments; Introduction to Two-dimensional NMR Spectroscopy; Interpretation of NMR Spectra.

FİZ645 Semiconductor Device Technology 3+0 7.5

Basic Properties of Semiconductor Materials: Crystal structure of semiconductors, Energy band structure, intrinsic semiconductors and doped semiconductors, Charge carriers, Statistics of donor and acceptor, Fermi energy level. Metal-semiconductor contacts: Metal semiconductor ohmic contact, Metal-semiconductor Schottky contact. p-n junctions: Basic structure of p-n junctions, Non-bias junction, Forward bias junction, Reversed bias junction, P-n junction current, Zener and tunnel diodes. Transistors: Bipolar transistors, Field effect transistors. Solar cells: Structure, Operation, Types.

FİZ646 Principles of Plasma Discharges 3+0 7.5

Introduction: Plasmas and sheaths, Discharges; Basic Plasma Equations and Equilibrium: Field equations, current and voltage, The conservation equations, Boltzmann's equation, Debye length; Atomic Collisions; Plasma Dynamics: Diffusion; Particle and Energy Balance in Discharges; Capacitive Discharges: Homogeneous model, Inhomogeneous model; Inductive Discharges: Inductive source configuration; Direct Current Discharges.

FİZ647 Natural Zeolites 3+0 7.5

General Information on Zeolites, Fibrous Zeolites, Zeolites With Singly Connected 4-Ring Chains, Zeolites With Doubly Connected 4-Ring Chains, Zeolites With 6-Rings, Zeolites of the Mordenite Group, Zeolites of the Heulandite Group, Thermal Behavior of Natural Zeolites, Cation Exchange Properties of Natural Zeolites, Environmental Applications of Natural Zeolites, Uses of Natural Zeolites in Industry and Agriculture.

FİZ652 Recommended Course Content 3+0 7.5

Colloidal Systems: Description and properties of colloidal dispersions, Electrical diffuse double layer, Stability of colloidal systems; Interparticle Forces in Colloidal Dispersions: Brownian motion and diffusion, Double layer repulsion, van der Waals interaction; DLVO Theory: Explanation of the stabilization mechanisms of colloidal systems with DLVO theory; Surface Electrokinetic Properties of Clay Beads: Calculation of ionic strengths of suspensions/solutions, Electrical double layer (EDL), EDL structures of clay grains; DLVO Forces Between Two Colloidal Grains in Water: Electrostatic interaction and van der Waals Forces, problem solving for calculating DLVO forces.

FİZ658 Characterization of Porous Materials 3+0 7.5

Introduction: Gas adsorption; Physical Adsorption Forces; Adsorption Isotherms; Measurement of Adsorption Isotherms; Adsorption Mechanism; Adsorption Hysteresis; Surface Area from the Langmuir and BET Theories; Other Surface Area Methods; Micropore Analysis; Mesopore Analysis; Pore Size and Surface Characteristics of Porous Solids By Mercury Porosimetry; Chemical Adsorption.

FİZ658 (Eng) Characterization of Porous Materials 3+0 7.5

Introduction: Gas adsorption; Physical Adsorption Forces; Adsorption Isotherms; Measurement of Adsorption Isotherms; Adsorption Mechanism; Adsorption Hysteresis; Surface Area from the Langmuir and BET Theories; Other Surface Area Methods; Micropore Analysis; Mesopore Analysis; Pore Size and Surface Characteristics of Porous Solids By Mercury Porosimetry; Chemical Adsorption.

FİZ692 Seminar 3+0 7.5

FİZ790 Thesis 0+1 30.0

FİZ890 Thesis 0+1 30.0

FİZ890-0 Thesis (Thesis Proposal) 0+1 30.0

FKG510 Pharmacobiotechnology 3+0 7.5

General definitions of biotechnology, history, drugs and therapeutics obtained by fermentation techniques, industrial production of antibiotics and points to consider, microbial transformation techniques, microorganisms used in microbial transformations, mediums, practice and natural products used as raw materials.

FKL501 Experimental Pharmacology 3+0 7.5

Mentality experimental approaches, knowledge, information and its importance, Methods of information retrieving, magnetic media and internet and their importance for experiments, relationship of knowledge-question-hypothesis, importance of information prior to experimental manipulations, materials and experiments, importance of control group, experiments and planning, pharmacological manipulation techniques, in vivo manipulations, in vitro models, data collection and handling, calculations of data and importance of statistics, evaluation, interpretation of results, documentation, application of an experimental technique.

FTK501 Advanced Toxicology 3+0 7.5

General Concept and Principles in Toxicology: General Knowledge About Poisons: Intake, Absorption and the excretion of poisons, Metabolism of toxic substances: The Mechanisms of Effect of the Toxicants: Special Toxic Effects: Mutagenesis, Carcinogenesis and teratogenesis: Systemic Toxicology: Selective Toxicity: The Factors Affecting Toxicity: First Aid and Treatment Procedures in Acute Intoxications: Drug Toxicity: Drug Dependence: Factors causing dependence, Dependence types: Substances with Doping Effect Used in Sports.

HAB521 Academic Writing Skills I 3+0 7.5

Origins of Scientific Writing: Types of scientific papers, Manuscripts and thesis; Types of Article: Original research, Review article (PRISMA), Case report, Technical note, Letter to the editor; Thesis: Part of the Thesis, First section (front pages), Main section (introduction, method results, etc.), Last section, References and Attachments; Ethics: Rights and permissions, Ethics committee approval; Practical Use of Office Programs in Thesis Writing: Practical applications of Word and excel; Presentation of Findings in Different Shapes: Tables and figures.

HAB522 High-İntensity Interval Training (HIIT) in Team Sports 3+0 7.5

High-İntensity İnterval Training (HIIT): Work interval intensity and duration, Relief interval intensity and duration, Exercise modality, Number of repetitions, Number of series, As well as the between-series recovery duration and intensity; Aerobic High-İntensity Training; Speed Endurance Maintenance Training; Speed Endurance Production Training; Repeated Sprint Training; High-İntensity Training Test Parameters: Laboratory testing, Field testing.

HAB523 Academic Writing Skills II 3+0 7.5

Parts of The Manuscript: Tittle page, Introduction, Methods, Results, Discussion, Conclusion, Acknowledgement, References; Other Topics: The abbreviations and usage; Applications of Software Used in Article Writing: Use of Photoshop program (presentation of findings), Use of some software (Endnote) in bibliography; The Cover Letter: Cover letter preparation; Answer to the reviewers: How to answer to the comments of reviewers; Ethics: The right to become a writer and author ranking.

HAB524 Talent Identification And Development In Sports 3+0 7.5

Biomotor Abilities in Development Stages: Speed, Strength, Endurance, Flexibility, and coordination development in children; Multi-development and Specialization; Talent Identification and Orientation Proper to Sports in Children; Talent Identification Models in Children: Different schools for talent identification, The aspect in Turkey for talent identification; Long-term Aims of Talent Identification.

HAB526 Training Principles For Spine, Upper, and Lower Extremities 3+0 7.5

Composition, Structure, and Biomechanical Behaviour of Connective Tissue; Posture and Body Mechanics; Training Specific to Proprioreception and Functional Movement; Maintaining Training for Acute and Chronic Injuries of Spine, Pelvis, Head, Shoulder, Elbow, Wrist, Hand, Foot, Ankle, Knee, Hip, and Sacroiliac Joints in Sports; Evaluation of Throwing, Kicking, Gait, Running, and Sprinting Mechanics, Injury Prevention Training in Physically Active Individuals.

HAB527 Antioxidants and Athletics Performance 3+0 7.5

Radical Concept and Properties: Reactive oxygen species, Reactive nitrogen species; The Sources of Radical Production and Mechanism, The Effect of Exercise on Radical Production and Oxidative Stress, Radical Production And Cellular Protection: Antioxidant strategy, Antioxidant defense system, Antioxidant function of vitamins, Reversible and İrreversible reactions of antioxidants, Nutrient sources of antioxidants, Positive and negative effects of antioxidant supplementations to sportive performance, Pro-oxidant effect of antioxidants.

HAB528 Current Trends In Strength Training 3+0 7.5

New Trends in Training Intended for Strength Training: Combined training, Complex training, Contrast training, Compound training, Functional training, Eccentric training; Training with Current Devices Supported to Strength Development: Velocity based training, İsoinertial training, Electromyostimulation training, Vibration training.

HAB529 Scientific Fundamentals Of Training 3+0 7.5

Training Structure; Loading and Adaptation; Volume and Intensity; Effects of Training: Immediate, Residual, and Cumulative Effects; Structures, Types, Effective Factors, and Training in terms of Muscular Strength, Speed, Endurance and Flexibility; Training Structure: Unit, Session, Microcycle, Mesocycle, Phase, Period and Macrocycle Training Samples; Training Control Methods: Field and Laboratory Performance Tests.

HAB531 Body Composition and Performance 3+0 7.5

Body Composition; Body Fat Mass, Fat Free Mass; Body Composition Assessment: Total body, Body segmen; Common Techniques To Assess Body Composition; Hydrostatic Weighing, Bioelectrical Impedance Analysis, Air-Displacement Plethysmography, Dual-Energy X-ray Absorptiometry, Skinfold and Girth Measurements; Effect of Body Composition on Performance Sports; Individual Sports, Team Sports

HAB532 Sports for Disability Persons 3+0 7.5

History of disability sports, General rules of Paralympics games, Paralympics sport foundations, Definition of disability person and classification, Effect of exercise education in Disability persons, Physical adaptation programs for disability persons, Dance activities for disability persons, Adapted sport activities for different disability persons, Sport accident and rehabilitation for disability athletes, Doping for disability athletes, Specific Olympic.

HAB533 Motivation in Sport 3+0 7.5

Definition of motivation concept: Definition of spur, incentive, motive and need, Development of motivation, Personal motivation and corporation communication, Development of motivation theory, Process and concept theory in motivation, Usage techniques of motivation in sport, Encouragement tools which are getting motivation, Easy motivation methods which are using in corporation motivation, Important components in athlete motivation.

HAB534 Movement And Training Principles 3+0 7.5

Human Body and Functional Movements: Axes, Joints, Upper and lower extremity movements; Growing stages in children; Peak Height Velocity; Basic Movement Concepts and Mechanics; Types of Muscular Activities; Energy Systems; Maximal Oxygen Consumption; Homeostasis; Steady State; Oxygen Dept; Liquid Requirement, Thermoregulation; Internal and External Factors Influencing Training; Basic Principles and General Structure of Training.

HAB535 Functional Anatomy 3+0 7.5

Basic Terminology of Kinesiology and Anatomy; Terms Related to Movement; Basic Anatomic Positions; Axis; Platform; Range of Motion; Tissue Mechanics; Neck Mechanics; Shoulder Mechanics; Thoracic Mechanics; Lumbar Mechanics; Hip Mechanics; Knee Mechanics; Mechanics of Resistance Training; Mechanics of Musculoskeletal Injuries; Mechanics of Running; Mechanics of Hitting; Mechanics of Kicking; Applications to Daily Life; Mechanics of Lifting; Mechanics of Balance; Gait Analysis; Mechanics of Footwear.

HAB536 Experimental Approach to Exercise Neurophysiology 3+0 7.5

Elective: The Concept of Motor Unit. Functions of different motor units. Electromyography (EMG). Filtering and absolute values. Integration and normalization. Assessments of muscular fatigue, contraction and relaxion through EMG data. Assessment of reflexive muscular activity by EMG. Methods in brain research and measurement of electrical activity of the brain. Stimulated brain potentials: Assessment of attention and cognitive processes. Assessment of central fatigue by EEG.

HAB537 Introduction to Exercise Neurophysiology 3+0 7.5

Basic Concepts on Central Nervous System: Neuroanatomy, Action potential, The evaluation of excitability and innervation terms; Macroscopic Anatomy of Central Nervous System: Brain membrane and vein sinus anatomy, The ventricles of brain, The circulation of cerebrospinal fluid, The gross anatomy of central nervous system; The Basic Structure and Functions of Central Nervous System: The basic structure and functions of truncus cerebri (medulla oblongata, pons, mesencephalon), The basic structure and functions of diencephalon (thalamus, hypothalamus, hypophysis, epithalamus), The basic structure and functions of formatio reticularis and cerebellum.

HAB538 The Fundamentals of Kinesiological Electromyography 3+0 7.5

History of Electromyography; The Definition of Electromyography; Usage of Electromyography; Motor Unit; Action Potential; The Nature of Electromyography Signal: The raw electromyography, Factors influencing the electromyography signal; Electromyography Amplifiers; Computation of The Electromyography Signal; Skin Preparation; Surface Electrode Selection: Skin surface electrodes, Fine wire electrodes; Guidelines Electrode Application: General guidelines, Anatomical landmarks, Motor point regions, Relative movement of the muscle belly; Signal Check Procedures: The raw electromyography baseline quality evaluation, Baseline noise, Baseline offset, Baseline shifts.

HAB539 Physiology I 3+0 7.5

Physiology I: Functional control of human body; Cell; Structure, organization and function, Cell membrane structure and function: Transport of jons and molecules across the cell membrane; Membrane Potentials and Action Potentials; Stimulation and Skeletal Muscle Contraction; Stimulation Contraction and Smooth Muscle; Stimulation and Contraction of The Heart Muscle; Cardiovascular System and Regulation; Kidney and Body Fluids; Regulation of Acid Base Balance; Carbohydrate, lipid and protein metabolism.

HAB540 Physiology II 3+0 7.5

Physiology II: Respiratory and regulation; Pulmonary Ventilation, Pulmonary circulation, To the pulmonary system of the gas diffusion mechanism: Organization of the nervous system; Sensory Receptors and Neuronal Circuits, Spinal cord motor function and control, Brain sections and control: Endocrine system, Endocrine system hormones and release controls, Hormones of the endocrine system functions.

HAB541 Physical Appropriateness 3+0 7.5

Definition of physical appropriateness and historical development, Physical appropriateness and education, Physical appropriateness criteria for general health, Physical appropriateness criteria for performance, Physical appropriateness for children, Physical appropriateness for elderly, Physical appropriateness criteria for disabilities person and physical appropriateness tests, European physical appropriateness norms and physical appropriateness tests, American physical appropriateness norms and physical appropriateness tests.

HAB542 Experimental Applications in Sportive Performance 3+0 7.5

Experimental approach to sportive performance. Measurement and assessment of somatotype and body fat percentage. Measurement and assessment of speed performance, isokinetic strength, squat, countermovement and drop jump power. Use of photocell, anemometer and thermo anemometer. Wingate test and use of Peak Bike. Conconi test and use of Polar heart rate monitor. Use of Lactate threshold field test and YSI lactate analyzer. Use of VO2max field test and K4b2 O2 analyzer. Motion analysis through image and use of SIMI motion analysis programme.

HAB543 Talent and Talent Identification for Sports in Children 3+0 7.5

Biomotor Abilities, Biomotor abilities in developmental stages of children; Speed, Strength, Endurance, flexibility and Coordination, Multi faceted development of children, Identification and orientation, and internal and external factors to orientate a special ability in children, Different approaches to talent identification for children with special talent, The situation in Turkey and long term aims for talent identification.

HAB544 Advanced Training Theory 3+0 7.5

Training and Basic Principles of Training; Loading and Adaptation; Effects of Training; Immediate; Residual and Cumulative Effects of Training; Structure of Muscular Strength and Strength Development Training; Types of Strength; Static and Dynamic Muscle Activation; Training Methods Developing Strength; Structure of Speed and Speed Development Training; Types of Speed; Factors Influencing Speed; Training Methods Developing Speed; Structure of Endurance and Endurance Development Training; Types of Endurance; Factors Influencing Endurance; Training Methods Developing Endurance; Structure of Flexibility and Flexibility Development Training; Types of Stretching; Factors Influencing Flexibility; Training Methods Developing Flexibility; Training Planning; Annual Plan; Unit; Microcycle; Macrocycle; Mesocycle Training; Combined Training; Altitude Training; Competition Training; Training Control Methods; Practical Performance Tests; Training Control Meth.

HAB545 Basic Training Theory 3+0 7.5

Human Body and Functional Movements; Axes; Basic Structure; Joint Actions; Upper and Lower Extremity; Growing Stages in Children; Pre Puberty; Puberty; Post Puberty; Physiological Changes in The Growing Children; Peak Height Velocity; Psychological Changes in Growing Children; General Psychological Development; Motor Learning Characteristics; Learning and Technical Training; Concept of Learning; Aims of Technical Training; Basic Movement Mechanics; Concepts of Movement and Laws of Motion; Muscle and Types of Muscular Activities; Energy Systems; Oxygen Transport System; Maximal Oxygen Consumption; Body Liquid Systems; Homeostasis; Liquid Accumulation and Loss; Temperature Regulation; Hormones; Local and General Hormones; Secreting Glands; Nutrition; Carbohydrates; Fats; Proteins; Minerals; Vitamins; Nutritional Intake for the Athletes; Internal and External Factors Influencing Athlete Training; Training and Basic Principles of Training; General S.

HAB546 Monitoring Training and Performance in Athletes 3+0 7.5

Basic Concepts on Athlete Monitoring: Body stress, Fatigue, Biochemical markers; Current Technologies in Monitoring Athlete: GPS technology, Heart rate telemetries, Questionaries based on computer technology; Measures of Fitness and Fatigue; Monitoring Different Conditioning Features; Athlete Monitoring and Evaluation Guidelines for Individual Sports; Athlete Monitoring and Evaluation Guidelines for Team Sports.

HAB547 Movement Science and Performance Training 3+0 7.5

Performance Training: New approaches on performance training; Programming performance training for individual and team sports; Evaluating the sports performance at the laboratory and field environment; Motion: Motion forms; Motions performed that two and three dimensions; Theoretical approaches and modern systems on motion analysis; Processes of motion analysis; Using required tools of motion analysis; Examining of sports techniques via motion analysis: Specific motion analysis of individual and team sports; Examining training effects via motion analysis system; Reporting the outcomes of motion analysis on training effects.

HAB548 Training Periodization in Team Sports 3+0 7.5

Periodization in Team Sports: Basic and history of periodization, The importance of periodization; Types of Periodization; Linear Periodization, Undulated periodization, Block periodization; Load and Recovery Relationship of Training: General adaptation syndrome, Fitness-fatigue model; Periodization of Different Periods: Daily, Weekly, Termly, Yearly periodization; Periodization of Different Conditioning Parameters: Periodization of strength, Speed and endurance.

HAB549 Analysis of Sportive Technique 3+0 7.5

The Concept and Mechanics of Movement: Axes and planes in defining movement, Kinetic and kinematic variables, The concepts of technique and skill; Analysing Technique With Qualitative Methods: Video based data recording and observation, Establishing strengths and weaknesses of the technique, Giving feedback on the ideal technique; Analysing Technique With Quantitative Methods: Synchronizing high speed cameras, Surface electromyography, Force plate etc., Dividing sport specific technical skills into phases, Analysing technique with basic kinetic and kinematic methods.

HAB550 Current Approaches and Corrective Exercises in Fitness Applications 2+1 7.5

Self-Myofascial Release Applications; Posture Analysis; Proprioseptive Exercises; Resistance Training; Flexibility; Active Streching; Stabilization; Mobilization; Plymometrics; Functional Movement Screening; Corrective and Protective Exercises; Training Load; Velocity Based Training; Acute-Chronic Work Load Ratio; Drill Categorization; Internal Load; External Load; Rating Of Perceived Exertion; Total Quality of Recovery; Injury Risk Monitorization; Strength Asymmetry.

HAB551 Periodization Methodologies in Football 3+0 7.5

The Importance of Tactical Periodization: What is tactical periodization, What is importance in football; Methodology of Tactical Periodization: Principle of specificity, Principle of making tactical principles of play operational, Principle of disassembly and hierarchical organization of principles of play, Principle of horizontal alternation in specificity, Principle of complex progression, Principle of performance stabilization; Small-Sided Games in Football: Changes of number of players, Field size, Rules of games vs. Effects on conditional parameters; Block Periodization: Six weeks periodization cycle, Overload and underload combined with small-sided games.

HAB552 Practical Application to the Study of VO2 Kinetics 2+1 7.5

Mechanistic Bases of VO2 kinetics: Model Characterization of VO2 kinetics, Mean Response Time, Oxygen Consumption During Resting, Time Constant of Oxygen Consumption, Explanation via Exponentiel Function of Slow Component of Oxygen Consumption, Data Modeling; Test Protocols of Constant Sub-sthreshold, Test Protocols of Constant Supra-threshold, Effects of Training with Different Intensities on VO2 Kinetics.

HAB553 Match and Player Analysis in Team Sports 3+0 7.5

Match Analysis Methods: Time-motion analysis; Real Time Data Tracking; Player Form; Card Chart; League Table Preparation; Team and Player Statistics Tracking; Defence and Offence Analysis; Spacing; Running Distance Analysis; Offence Strategies; Game System Analysis; Home-Away Analysis; Scouting; Playing Time; Clip Editing; Reporting; Display; Analysis Programmes; Communication and Feedback for Player.

HAB555 Electrophysiological Training Methods in Sports 2+1 7.5

Basic Concepts of Electricity and Current Terminology Related to Human Physiology; The Use of Sportive Performance of Electrophysiology, Electrical Muscle Stimulation techniques and applications, Basic mechanisms of electrical muscle stimulation: Chemical mechanism: Action potential, Intensity-duration curve of electrical currents, Physiological mechanism, Neural mechanism, Electrical muscle stimulation parameters and regulations; Amplitude; Amplitude increase and decrease time, Frequency, Pulse duration, Work time, Electrodes.

HAB556 Physical Activity and Technology Use 3+0 7.5

Technology is studied based on its effectiveness in incorporating the sedentary population into exercise programs. The use of mixed technology-based physical activity interventions and physical and physiological changes due to behavioral changes in individuals are discussed. It is aimed to evaluate and change the basic health consequences of sedentary behavior with technological-based physical activity models. Studies are carried out to develop and evaluate technology-based intervention programs that aim to increase the level of physical activity and provide the necessary theoretical and practical information for data collection and interpretation.

HAB557 Oxygen Uptake Kinetics 2+1 7.5

Aerobic Energy Metabolism: Maximal Oxygen Consumption, Exercise Economy, Running Economy, Oxygen Debt; Oxygen Uptake Kinetics, VO2, VO2 Kinetics Concept; Constant Load Exercises: Sub-Threshold Exercises, Supra-threshold exercises, Phases of VO2 Kinetics: First Phase (Cardiodynamic Phase), Phase II (Basic Phase), Phase III (Steady State Phase), Slow component of VO2, Physiological Basis of Oxygen Transport and Use.

HAB559 Acute and Chronic Adaptation to Exercise at High Altitude 2+1 7.5

Physiological Effects of High Altitude: Acute Effects of Altitude on Maximal Oxygen Consumption, Hearth Rate, Stroke Volume, Cardiac Output, Acute Effects of Altitude on Exercise Economy, Running Economy and Oxygen Debt; General Altitude Training Concepts; Live High Train Low, Live High Train High, Live Low Train High, Intermittent Hypoxia Training, Physiological Responses to Normobaric Normoxy and Normobaric Hypoxia.

HAB561 Exercise and Oxidative Stress 3+0 7.5

Exercise and Oxidative Stress: Reactive Oxygen Species and Free Radical Concept; Antioxidant Defense System; Oxidative Stress; Mechanism of Free Radical Production During Aerobic and Anaerobic Exercise; Reactive Oxygen Species and Skeletal Muscle Function; Fatigue Mechanism and Delayed Muscle Pain Syndrome; Antioxidant Defense System in Response To Acute and Chronic Exercise; Exercise, Oxidative Stress and Antioxidant Supplementary.

HAB563 Current Literature in Movement and Training and Applied Project Development 2+1 7.5

Scanning and analyzing current literature in the movement and training, creating new research questions by synthesizing current and existing research results, concept of project, the aims and universal benefits of project, project manager and stakeholders, creating an effective and dynamic team and developing communication skills, sharing duties and responsibilities, efficient use of resources, project duration and time management, determining success criteria, identifying risks, developing alternative solutions for unforeseen situations, executing the project, closing project, reporting and publishing the results, realizing and maintaining benefits of the Project.

HAB565 Physical Activity Recommendations and Assessment 3+0 7.5

It is aimed to critically evaluate physical activity and assessment methods, and the basic health consequences of sedentary behavior. Theoretical and practical information necessary for evaluating intervention programs and collecting and interpreting data is provided. In order to evaluate the components of physical activity, necessary measurement skills are gained in international standards. During the course, current research and practical applications are discussed. They are encouraged to use appropriate analytical and interpretive skills to make sound decisions regarding physical activity, sedentary behavior, and health status.

HAB592 Seminar 3+0 7.5

HAB622 Oxidative Stress Responses to Aerobic Exercise 3+0 7.5

Hemoastase:The balance between oxidative stress and antioxidant defense system; Free Radical Production Mechanisms:Mechanism of free radical production during aerobic exercise, Structure of mitochondria, ATP production, Electron trasport chain, Complex structures; Acute Aerobic Exercise And Free Radical Production; Chronic Aerobic Exercise And Free Radicals; The relationship between radical production and aerobic exercise with intensity, frequency and volüme.

HAB623 Oxidative Stress Responses To Resistance Exercise 3+0 7.5

Mechanisms of Free Radical Production: Mechanism of free radical production during resistance (anaerobic) exercise, Production of xanthine and NADPH oxidase, Prostanoid mechanism, İschemia reperfusion mechanism, Phagocytic respiratory burst activity, Acute resistance exercise and free radical production, Chronic resistance exercise and free radical; The relationship between radical production and intensity, frequency and volume of resistance exercise training.

HAB624 Muscle Damage Paradigm 3+0 7.5

Muscle Damage: Understanding the mechanism of muscle damage, Paradigm of exercise-induced muscle damage, Relationship between muscle damage and oxidative stress; Problem of muscle damage level; Types of muscle contraction: The relationship between different muscle contractions and muscle damage; Relationship between muscle damage, oxidative stress and performance;Muscle damage and antioxidant supplementation:The effect of acute and chronic antioxidant supplementations on muscle damage and oxidative stress level.

HAB625 Physiological Basis Of Human Performance 3+0 7.5

Physiological Changes related with Training: Cardiorespiratory Adaptations, Muscular Adaptations, Biochemical Adaptations, Effects of Different Training Types to Human Performance, Athlete Training, Top Level Athlete Training, Physiological Principles of Athletic Training in Adults: Fitness and Effects of Fitness to Performance, Importance of Weight Control in Performance.

HAB626 Fundamental Of High-Lovel Performance 3+0 7.5

Yüksek Düzey Performansın Analiz Edilmesi: Fizyolojik Prensipler Kullanılarak Analiz, Biyomekaniksel Prensipler Kullanılarak Analiz, Mekaniksel Prensipler Kullanılarak Analiz; İnsanın Sınırları; Yüksek Düzey Performans için Gereken Kapasiteler ve Yetiler: Yüksek Düzey Performans için Gereken Aerobik Kapasite, Yüksek Düzey Performans için Gereken Anaerobik Kapasite, Yüksek Düzey Performans için Gereken Atletik Yeti, Yüksek Düzey Performans

için Gereken Fiziksel Yeti, Yüksek Düzey Performans için Gereken Motor Yeti, Yüksek Düzey Performans için Gereken Psişik Yeti.

HAB627 Training Perıodızatıon 3+0 7.5

Periodization Concept and Different Periodization Approaches; Microcycle, Mesocycle and Macrocycle Structures in Training Related to Loading and Fatique; Active/Pasive Rest; Relationships Among Loading, Recovery and Supercompensation; Adaptation to Training; Periodization in Team and Individual Sports; Periodization Strategies; Single- and Multi-Periodization, Problems and Solutions in Periodization; Tapering; Detraining and Retraining.

HAB629 Advanced Anatomy in Sports 3+0 7.5

Basic Terms of Kinesiology and Anatomy; Terms of Movement; Basic Anatomical Stance; Axis; Platform; Range of Motion; Tissue Mechanics; Neck Mechanics; Shoulder Mechanics; Thoracal Mechanics; Lumbar Mechanics; Hip Mechanics; Knee Mechanics; Mechanics of Resistance Training; Mechanics of Musculoskeletal Injury; Mechanics of Running; Mechanics of Hit; Mechanics of Kick; Applications to Daily Life; Mechanics of Lifting; Mechanics of Balance; Gait Analysis; Mechanics of Footwear.

HAB630 Adaptation to Strength Training 3+0 7.5

Characteristics of Neuromuscular System particular to Strength Training; Myogenic Effects of Strength Training and Neurogenic Effects of Strength Training; Alterations in Men related with Strength Training; Alterations in Women related with Strength Training; Alterations in Elder People related with Strength Training; Strength Training Specific to Sports; Effects of Nutrition to Strength Training Adaptation.

HAB632 Biostatistics 3+0 7.5

Biostatistics: Statistical decision theory: Hypothesis testing, Parametric and non parametric approaches, With large sample hypothesis testing, Hypothesis testing with small samples; Strength Testing; Chi Square Distribution: Chi square tests; Simple Linear Regression and Correlation Techniques, T Test; Analysis of Variance; Analysis of Covariance; Random Block Design; Factorial Experiments; Multivariate Statistical Tests; Factor Analysis; Multivariate Analysis of Variance; Multivariate Analysis of Covariance.

HAB633 Training Theory I 3+0 7.5

The Concept of Training; Loading and Recovery; The Structure of Efficiency; The Concept of Performance: Performance Follow Up, Evaluation of Performance, Factors Affecting Performance; Basic and Secondary Principles of Training; The Relationship between Loading and Resting; Recovery and Planning; Periodization; Structure of Microcyle; Structure of Mesocyle; Structure of Macrocyle; Single and Multi Periodization; Children and Training; Stages of Development and Training; Biomotor Characteristics and Training; Talent Selection and Talent Orientation; Antropometry; Endurance Development; Physiology of Endurance; Maximal Oxygen Consumption; Anaerobic Threshold; Running Economy; Training Methods in Endurance Development .

HAB634 Adaptation to Strength Training 3+0 7.5

Strength; Types of Strength Training; Biological Fundamentals of Strength Training; Miogenic and Neurogenic Effects of Strength Training; The Biomechanics of Resistance Exercises; Prenciples of Strength Training; Methods of Strength Training; Characteristics of Neuromuscular Structure Spesific to Strength Training; Effects of Nutrition to Strength Training Adaptation; Alterations in Strength by Combined Training; Detraining; Strength Training to Age Groups; Strength Training Spesific to Sports; Periodization of Strength Training; Alterations Related to Strength Training in Women; Responses to Strength Training in Elder People.

HAB635 Exercise Prescription 3+0 7.5

Exercise Prescription: Activity Models of Guidance and Risk Levels; Exercise and Quality of Life; Exercise Tests and General Principles; Assessment and Exercise Prescription Principles; VO2 Based Exercise Prescription; By Cardiorespiratory Fitness Exercise Prescription; Exercise Prescription Based on Perceived Exertion; According To the Load of Exercise Prescription; Prescribing Exercise To Lose Weight; By Cardiovascular Endurance Exercise Prescription; Exercise Prescription for Muscle Strength; Exercise Prescription for Flexibility and Balance; Individual Evaluation and Testing.

HAB636 Training Theory II 3+0 7.5

Strength Development: Physicomechanical bases of strength, Various types of strength, Measurement of Strength, Periodization of Strength, Strength in Various Sports; Speed Development; Physicomechanical Structure of Speed, Factors affecting Speed, Speed training exercises, Speed tests, Anaerobic strangth and capacity; Flexibility Development: Flexibility and its physicomechanical characteristics, Various types of flexibility, Flexibility training; Training and Children; Training and

Stages of Development; Biomotor Characteristics and Training; Talent Selection and Talent Orientation; Antropometry, Training and Fatigue; Loading/Recovery/Fatigue; Control of Fatigue: Planning the training process; Control of Fatigue: Active/passive rest; Control of Fatigue: Nutrition and periodization; Form Training: Volume, intensity and frequency relations, Planning form training; Altitude Training and Periodization; Women Athletes and Trainig: Menstruation, repose and sleep.

HAB637 Anti Aging and Exercise 3+0 7.5

Anti Aging and Exercise: Age Period and the Classification of the Aging Process; Theories Related To the Aging Process; Aging Physiology; Aging in the Process of Cardiopulmonary, Skeletal Muscle and Nervous System Changes: Old Age and the Effects of Exercise; Old Age, Illness And Exercise; In Old Age the Basic Principles of Exercise and Exercise Prescription; Cardiovascular Exercise Programs for Older Individuals; Aged for Muscle Strength Exercise Programs for Individuals; For Elderly Individuals for Flexibility and Balance Exercise Programs; Old Age, Risk Factors and Mesasures of Exercise in the Process Are Explained.

HAB638 Exercise Approaches for Special Groups 3+0 7.5

Exercise Approaches for Specific Groups: Exercise Management; Exercise As A Treatment; Children and Teenagers Exercise; Women in the Exercise; Exercise in the Elderly; Metabolic Syndrome and Exercise; Obesity and Exercise; Anemia and Exercise; Asthma and Exercise; Diabetes and Exercise; Hypertension and Exercise; Fibromyalgia and Exercise; Hyperlipidemia and Exercise; Chronic Fatigue Syndrome and Exercise.

HAB639 Performance Monitoring in Sport 2+1 7.5

Basic Concept of Athlete Monitoring: Body Stress, Fatigue, Biochemical markers; Current Technologies in Monitoring Athlete: GPS technology, Heart rate telemetries, Questionaries' based on computer technology; Measures of Fitness and Fatigue; Monitoring Different Conditioning Features; Athlete Monitoring and Evaluation Guidelines for Individual Sports; Athlete Monitoring and Evaluation Guidelines for Team Sports.

HAB640 Sportive Technical Analysis Applications 2+1 7.5

Kinetic and Kinematic Analysis Methods: Angle, Velocity, Acceleration, Angular and linear velocity, Joint moment and power; Organizing Three Dimensional Analyzing Environment: Camera placement, Marker placement, Volume calibration, Collecting and analyzing data; The Use of Surface Electromyography: Skin preparation, Normalization techniques, Collecting data and analyzing data.

HAB641 Biomechanics of Musculoskeletal System I 3+0 7.5

Mechanics, Biomechanics, Biomechanics of Musculoskeletal System and Its applications: Kinetic, kinematic, materials, biomaterials, Low of mechanics; Measurement Methods in Biomechanics: Active and passive converters, modelling, simulation; Clinical Applications: The composition of bone and its physical features, The mechanics of soft tissues, Muscle Biomechanics, Bone grafts, The healing of bone fractures; Implants: The implant materials and bio-adaptation, The relationship between bone and implant material; External Fixators.

HAB642 Global Positioning System (GPS) and Sport Specific Testing 3+0 7.5

Basic Principles of Global Positioning Systems; Metabolic Power; Indoor and Outdoor Tests; Data Collection; Data Processing; Reporting; Theoretical and Practical Applications; Training Record; Physical Demand; Low Moderate High Intensity Activity; Injury Risk Index; Real Time Player Tracking; Applications of Different Sport Branches; Location; Acceleration Deceleration; Change of Direction; Hotspot Plots; Jump; Player Load; Collisions; Repeat High Intensity Efforts.

HAB643 Neuromuscular Adaptation and Fatigue 3+0 7.5

Introduction to Nervous System; Introduction to Muscle Physiology; Skeletal Muscle Mechanisms; Muscle Physiology of Strength, Speed, Power and Endurance Performance; Definitions of Strength, Speed, Power and Endurance; Differences Among Muscular Strength, Endurance, and Power; Neural Activation in Strength, Speed and Power Performance; Motor Units; The Effect of Contraction Type on Motor Unit Activation;The Effect of Contraction Speed on Motor Unit Activation; Neuromuscular Adaptation in Physical Work; Definition of Fatigue; Causes of Fatigue; Fatigue in Strength, Speed and Power Performance; Recovery.

HAB644 Biomechanics of Musculoskeletal System II 3+0 7.5

The types of joints and joint biomechanics; Vertebrae: Cervical vertebrae, Thoracal and lumbar vertebrae; Shoulder: Gleno-humeral joint, Scapular joint, The movement patterns on shoulder girdle; Elbow: The Biomechanics of healthy elbow; Hand

and Wrist: Hand biomechanics, Wrist Biomechanics; Hip Joint; Knee Joint: Knee Biomechanics, Patella-femoral joint biomechanics; Foot and Ankle Biomechanics; The Analysis of Walking: Basic concepts, Clinical applications.

HAB645 Training Load Monitorization and Field Test in Team Sports 1+2 7.5

Time Motion Analysis Via Global Positioning Systems: Sprint analysis (number and duration), Running speed analysis (max, min, avr), Physical activity record, Total running, Distance, Total running time, Load percents, Exertion points, Speed calculations; Training Units Calculations: F.I.T.T. principle, Metabolic power; Field Tests: Indoor and outdoor tests, Data collection, Data processing, Reporting, Theorical and practical applications, Training record, Physical demand, Low-Moderate-High intensity activity, Injury risk index, Different pitch size trainings, Real-time player tracking, Applications of different sport branches, Location, Force, Angle, Direction, Dista.

HAB646 Electromyography Signal Processing 3+0 7.5

Basic signal processing applications: Rectification, Smoothing, Moving average methods, Root mean square, Digital filtering, Amplitude normalization, ECG Reduction; Further signal processing: Muscle activation evaluation, Muscle activation comparison, Muscle activation timing, Evaluation of fatigue, Wavelet analysis, Time-frequency approach; The analysis on frequency domain: Median frequency analysis, Mean value analysis.

HAB692 Seminar 3+0 7.5

HAB701 Research in Area of Specialization 3+0 4.5

HAB702 Research in Area of Specialization 3+0 4.5

HAB790 Thesis 0+1 30.0

HAB890 Thesis 0+1 30.0

HAB890-0 Thesis (Thesis Proposal) 0+1 30.0

HAB901 Research in Area of Specialization 5+0 7.5

HAB902 Research in Area of Specialization 5+0 7.5

HEE501 Satellite Based Navigation Systems 3+0 7.5

Basic Principles of Satellite Orbiting; GPS (Global Positioning System): Space segment, Sig-nal types, Ground control segment, User segment, Signal processing in GPS receiver, Error sources, Signal formats; GLONASS (Global Navigation Satellite System); Galileo; COM-PASS and Other Satellite Navigation Systems; Precision and Reliability Augmentation Tech-niques in Satellite Navigation: Space-based augmentation techniques, Ground-based augmen-tation techniques, Aircraft-based augmentation techniques; Concept of CNC/ATM and Its Development.

HEE502 Sensors and Transducers 3+0 7.5

Basic Principles: Basic elements and input/output configuration of measurement systems, Sensing and transducing principles, Units and standards, Error analysis, Uncertainity, Calibration; Behavioral Characteristics of Measurement Systems: Static and dynamic behavior, Response to different input types; Modelling: Mathematical model, Software simulation; Operating Principles and Construction Methods of Sensors/Transducers: Resistive, Inductive, Capacitive, Optic, Magnetic, Piezoelectric, Anemometer, Humidity sensors, Proximity sensors, Modern measurement systems: Digital transducers, Smart and micro-electronic sensors, Signal conditioning circuits, Sensor selection.

HEE511 Fundamental Measurement Methods in Aviation 3+0 7.5

Introduction: Aircraft indicator classes and groups, Basic physical quantities measured on aircraft; Pitot-Static Indicators: Airspeed, Altitude, Vertical velocity, Mach number; Gyroscopic indicators: Gyro principles, Horizontal direction, Vertical direction, Rotation speed; Magnetic Direction Indication: Earth's magnetic field, Magnetic compass, Gyro-compass; Engine Gauges: Pressure measurement, Force and torque measurement, Temperature measurement, Liquid amount measurement, Flow measurement, Position measurement, Rotation speed measurement, Acceleration measurement.

HEE512 Aviation Applications with Matlab 3+0 7.5

Matlab Fundamentals: Variables and Arrays, Four Operations on Scalars and Matrices, Multidimensional Arrays; Mathematical Operations: Complex Number Operations, Trigonometric Function Operations, Exponential and Logarithmic Function Operations, Sequence and Matrix Operations, Polynomial Operations, Systems of Linear Equations; Programming Files: m files, Sample Applications; Graphics Operations: Graphics Window, Simulink: Worksheet, Library, Aviation Applications.

HEE514 Fundamental Sensor Technologies 3+0 7.5

Introduction: Basic elements of measurement systems and input-output relationships, Calibration; Fundamental Sensor Properties: Static properties, Dynamic properties, Reactions to different types of inputs; Sensors According to Detection Principles: Mechanical, Resistive, Inductive, Capacitive, Thermoelectric, Optical, Magnetic, Piezoelectric, Chemical; Modern Measuring Systems: Digital transducers, Intelligent sensors, Micro-electronic sensors; Sensor selection.

HEE592 Seminar 3+0 7.5

HEE602 Signal Processing in Receivers of Satellite Based Navigation System 3+0 7.5

Satellite Based Positioning Systems (GNSS): GPS, GLONASS, Galileo, Beidou, SBAS, GBAS, RTK, Other regional positioning systems; GNSS Signal Structure: Signal components, Data verification algorithms, Modulation technics; Receiver Components: Antenna, Front end section, Signal processing section, Data processing section; Signal Processing Steps in Receiver: Signal acquisition, Carrier and code tracking, Demodulation of navigation message, Computation of position; GNSS Receiver Types.

HEE610 Systems of Modern Gas Turbine Engines 3+0 7.5

Engine Control Systems in General; Thermal Management for Engines; Internal Air System; Active Clearance Control; Lubrication System Design and Operation; Fuel System Design and Operation; Speed and Thrust Control; Introduction to FADEC System; Future Trends in FADEC System Design; Thrust Reverser Control System; Engine Servo Control System; Mechanical Engine Controls; Variable Geometry System; Clearance Control System; Hydromechanical Control Unit; Power Management System; EEC Control System; Engine Condition Monitoring System; Engine Vibration System; Engine Electrical Wiring Harnesses.

HEE611 Space Propulsion Systems, Sensors and Instruments 3+0 7.5

Spacecraft Propulsion Systems: Applications, Classifications; Characteristic Parameters: Thermodynamics, gas dynamics and nozzles, Propulsion systems, Liquid propulsion systems, Solid propulsion systems, Hybrid propulsion systems, Other non-chemical propulsion systems, Electric propulsion systems, Ramjet and Scramjet; Space Propellants; Fundamentals of Orbital Mechanics: Introduction to Earth observation, Electromagnetic waves; Theory of the Earth Observation System; Sensors: Sensor electronics, Optical space sensor systems, Infrared sensors, Sensors for satellites status detection, Microwave sensor systems.

HEE613 Soft Computing in Aviation 3+0 7.5

Learning and types of learning, optimization techniques, introduction to neural networks, single layer perceptrons, multi-layer perceptrons, backpropagation algorithm, implementation of neural networks on control problems, fuzzy sets, operations on fuzzy sets, fuzzy relation and composition, fuzzy inference systems, fuzzy controllers, adaptive neuro-fuzzy inference systems (ANFIS), radial basis functions (RBF), genetic algorithms, other derivative-free global optimization methods.

HEE615 Dielectric Properties of Polymer Materials 3+0 7.5

Polymers: Basic Concepts, Classification of Polymers, Structure of Polymers; Dielectric Properties: Dielectric Constant, Dipole, Dipole Moment, Electrical Polarization, Classification of Dielectrics, Clausius-Mosotti-Lorentz-Lorenz Equation, Onseger Local Field, Dielectric Resting and Loss, Dielectric Properties of Different Materials; Experimental Studies.

HEE692 Seminar 3+0 7.5

HEE790 Thesis 0+1 30.0

HEE890 Thesis 0+1 30.0

HEE890-0 Thesis (Thesis Proposal) 0+1 30.0

HİD501 Watershed Hydrology 3+0 7.5
Overland Flows; Sediment Transport by Overland Flows; Subsurface Storm flow; Unsaturated Flow and Groundwater Flows; River Flow Modeling, Computer Models for Watershed Hydrology.

HTK501 Air Traffic Management and Aircraft Performance I 3+0 7.5
Air Traffic Management System; Aircraft Performances for Air Traffic Environment: Mission profile, Mission profile and aircraft movements, Air traffic control services in mission profile; Definitions of Speeds and Weights; Aero-Propulsive Models; General Equations of Motions; Level Flight Performances: Specific level flight performances for flight operations; Climb Performances: Specific climbing performances for flight operations; Descent Performances: Specific descending performances for flight operations; Take-off and Landing Performances: Specific take-off and landing performances for flight operations; Turning Performances: Specific turning performances for flight operations; Aircraft Trajectory: Trajectory prediction with Eurocontrol BADA model.

HTK502 Models and Simulation in Air Traffic Management I 3+0 7.5
Fundamentals of Simulation and Modelling; Discrete-event Simulation Methodology; Taxonomy and Comparison of ATM Simulation Tools; Data Collection and Processing; Model Construction: Airport and airspace modeling; Experiment Design: Construction of baseline and alternative scenarios; Simulation: Test and production runs, Troubleshooting; Applications: Capacity and delay analysis, Conflict detection and resolution; Post Simulation Analysis: Analysis of results, Documentation, Animations and presentation; Verification and validation of simulation models.

HTK504 Air Traffic Flow Management and Airspace Capacity Analysis 3+0 7.5
Components of Air Traffic Management: Airspace management, Air traffic services, Air traffic flow management; Functions of Air Traffic Management: Organization, Planning-Control, Co-ordination; Staffing; System of Air Traffic Management; Categorization of Problems in Air Traffic Management; Capacity: Definitions; Factors Determining Capacity: Airspace, Technical equipment, Aeroplane, Human performance, Procedure; Capacity Models; Literature Review; Scheduling Algorithm Method for Flow Planning; Short-term and Medium-term Conflict Models.

HTK505 Multi-Criteria Decision-Making 3+0 7.5
Basic concepts: Decision-making, Decision process, Model, Types of models; Mathematical Programming: Model studies, Solution methods, Multi-criteria; Multi-Objective Decision Making: Criteria, Objective; Analytical Hierarchy Process: Sub-Criteria, Alternatives, Divided comparison, Spare analises, Sensitivity analysis; Analytical Network Processes: Cluster, Element, Internal dependence, External dependence, Un-weighted Matrix, Limit matrix; TOPSIS: Positive ideal solution, Negative ideal solution; ELECTRE: Normalization, Concordance indexes, Dominancy; Utility Functions.

HTK506 Statistical Analysis for Air Traffic System 3+0 7.5
Using Statistical Analysis in Air Traffic System Problems; Data Collection and Analysis; Basic Statistical Concepts: Summary of numerical knowledge, Probability, Sampling, Point forecast, Period forecast, Hypothesis testing, Correlation and regression analysis, Variance analysis; Using Softwares in Analysis; Flight Data Statistics Analysis for Specific Airport: Data collection, Categorization, Analysis, Reports.

HTK507 Research Methods for Air Traffic System 3+0 7.5

History of Research on Air Traffic Control Problems: Researches in the USA, NASA and FAA, European research and strategies, Researches in Turkey; Research Requirements and Needs; Vision of Research and Development; R&D Politics and Strategies; R&D Methodologies; R&D Resources: Human resources, Finance, Technical infrastructure, Technology-Knowledge, Regulations, etc.; Innovation and Entrepreneurship; Industrial and Intellectual Property Rights; R&D Culture and Education; R&D Organization and Collaboration; Development of R&D Software; Strategic Management of R&D; Relationship Between R&D and Economic Growth; Examination of New Developments in Air Traffic System; Research Cases.

HTK508 Human Factors in Air Traffic Control 3+0 7.5

Discussion of Relationship Between Safety and Human Factors in Air Traffic Management; General Concepts and Definitions; Safety Culture; Controller Performance and Affecting Factors: Individual differences, Information processing, Situational awareness, Organizational climate, Team work, Stress, Shiftwork, Workload; Human Error: Importance of human error in aviation, Definition and classification; Error Models; Communication: Communication process, Communication models and modes; Working Environment: Ergonomics, Equipment and tools, Automation, Human-Machine interface; Human Factors in Future Systems; Examination of Cases Related to Human Factors .

HTK509 Real Time Simulation and Data Analysis in Air Traffic Control 3+0 7.5

Basic Concepts: Definition of simulation, Using simulation in aviation, Air traffic management, air traffic control services, Non-radar control, Radar control, Area control services, Approach control services, Aerodrome control services; Simulation: Simulation techniques, Simulation requirements, Stage of preparing simulation, Real-time simulation, Using real-time simulation in education, Using real-time simulation in research, Methods for simulation techniques in non-radar environment, Methods for simulation techniques in radar environment; Assessment: Assessment and rating in simulation education, Exercices evalution and assessment.

HTK510 Advanced Aircraft Controls and Navigation I 3+0 7.5

Basic Concepts; Introduction to Aircraft Dynamics: Static stability and control, Dynamic stability and control, Lateral modes; Advanced Dynamics and Simulation Modelling for Aircrafts; Basic Navigation Techniques; Modern Control and Navigation Techniques for Air Vehicles: Linear techniques, Non-linear techniques and optimal control techniques, Sensor fusion, Modern avionics systems, Flight testing and system identification, Case studies and projects.

HTK511 Air Traffic System and Evulation Criterion 3+0 7.5

Concept of System; Concept of Transportation ve Systems; Air Transportation System and Sub-Systems; Elements of Air Transportation System; Importance of Air Transportation System; Definition of Air Traffic System; Functioning of Air Traffic System: Inputs of air traffic system; Processes in Air Traffic System, Outputs of Air Traffic System, Environment of Air Traffic System; Genel Specifications of Air traffic System; Place and Importance of Air Traffic System in Air Transportation System; Air Navigation Service Providers; Figures of Merit for Air Traffic Control Systems; Comparion of Air Navigation Service Providers Based on Figures of Merit.

HTK512 Performance Based Navigation and Design Methods 3+0 7.5

Basic Definitions, The Concept of Performance Based Navigation (PBN): Lateral performance, Vertical performance; Specifications of Navigation; Required Navigation Performance (RNP); Types of RNP; RNP in the En-route and Terminal Control Area, Infrastructure of Navigation Aids; The Application of Navigation: Route Design Based on RNP and Point Merge System (PMS); RNP and PMS SIDs and STARs; Application of Performance-Based Route Design in Simulation Environment.

HTK513 Quantitative and Qalitative Research Methods in Air Traffic Control 3+0 7.5

Introduction; History of Scientific Research; Related Concepts and Definitions; Quantitative Research Methods; Qualitative Research Methods; Mixed Research Methods; Scientific Re-search Ethics and Integrity; Quantitative Research Methods in Air Traffic Control; Qualitative Research Methods in Air Traffic Control; Sample Problems and Solutions, Reporting and Presentation; Discussions.

HTK515 Human-Computer Interactin in Air Traffic Control 3+0 7.5

History of Human and Computer Interaction; Related Concepts and Definitions; Human Per-ception, Ergonomics, Cognition, and Psychology; User-Centered Design; Task Analysis in User Interface Design; Principles of User Interface Design; Components of User Interface Design; Interface Programming; System Evaluation; Accessible Design; Ergonomic issues in air traffic control, Ergonomic issues for equipment, Ergonomic issues for displays; Related Studies.

HTK517 Scientific Research Projects in Air Traffic Control 3+0 7.5

Aims of Scientific Research Projects; Introduction to Scientific Research Projects; Project Abstract; Project Purpose; Project Scope; Project Literature; Original Value of Projects; Pro-ject Management; Project Work Packages; Project Opportunities; Added-Value of Projects; Success Criteria for Project; Project Budget; Project Management; Analysis and Evaluation of Current Projects; Evaluation of Student Projects; Discussion of Projects.

HTK519 Dynamic Airspace Management 3+0 7.5

Introduction to Airspace Concepts: Demand and Capacity Relations in Air Traffic System; Airspace Structures: Adaptable airspace, Generic airspace, Conventional low altitude airspace, High altitude airspace, Super-density airspace strudtures; Dynamic Air Space Structures: Dynamic route planning, Dynamic sectorization; Simulation and Modelling of Dynamic Airspace Structures in the Air Traffic System; Next-Gen and SESAR Examples of Dynamic Air Space Management.

HTK520 Air Traffic Management and Environmental Impacts 3+0 7.5

ATM and Environmental Impacts: Understanding of environmental issues relevant to aviation, The impacts of aviation on air quality and climate change; ATM and Environmental Impacts: Operational parameters, Aircraft emissions, Noise, Environmental impacts around airports, Landing and Take-off cycle, Environmental impacts during approach and climb phase, Noise abadement procedures; Environmental Assesment: The calculation of aircraft emissions, Emission estimation tools; Flight Efficiency; ATM factors affecting flight efficiency, Horizontal flight efficiency, Vertical flight efficiency; Operational improvements: CDO and CCO concepts, Direct routing.

HTK521 System Analysis and Desing 3+0 7.5

System Concept and General System Theory: Introduction and Definitions; Information System and Information System Types: Information System Development Process, System Analyst Duties and Capabilities; Preliminary Investigation and Feasibility Analysis, System Proposal Preparation and Presentation, Systems Analysis, Difference Between the System Life Cycle and System Development Methodology; Systems Design; Systems Implementation, Process of Transition to a New System.

HTK522 Airspace Capacity and Traffic Flow Optimization 3+0 7.5

Basic Concepts: Airspace capacity, Theoretical capacity, Practical capacity, Delay, Congestion, Saturation; Capacity and Delay Estimations; Airspace Capacity and Traffic Flow Problems; Solution approaches for Airspace Capacity and Traffic Flow Improvement; Basic Concepts regarding Mathematical Modeling; Mathematical Modeling of Optimization Problems regarding En-route and Terminal Airspace; Introduction to Heuristic and Meta-heuristic Approaches; Adaptation of Heuristic and Meta-Heuristic Approaches to Airspace Capacity and Traffic Flow Problems.

HTK524 Use of Decision Models for the Solutions of Air Traffic Management Problems 3+0 7.5

Concept and elements of Air Traffic Management; Analytic Hierarchy Process for Decision Making; Use of Analytic Hierarchy Process for Solutions of Air Traffic Management Problems; Decision Trees; Use of Decision Trees for Solutions of Air Traffic Management Problems; Optimization Models; Use of Optimization Models for Solutions of Air Traffic Management Problems; Use of Other Decision Models for Solutions of Air Traffic Management Problems;

HTK592 Seminar 3+0 7.5

HTK601 Air Traffic Management and Aircraft Performance II 3+0 7.5

Introduction to Air Traffic Management and Aircraft Performance ICAO Annex 6; g Factor; Maximum Structural Weights; Maneuvering Envelope; Engine Limitations; Take-off Performance and Limitations, The factors of effecting performance; Cruise Performance, Cruise speeds, Cruise range and endurance, The factors of effecting cruise performance; Landing Performance and Limitations, The factors of effecting landing; Weight and Balance, The determination of center of gravity; Mission Profile, Operational analysis of flight phases; Pre-flight; Determination of Fuel; Aircraft Airworthiness.

HTK603 Models and Simulation in Air Traffic Management II 3+0 7.5

Simulation Models in Air Traffic System Problems; Fundamentals of Simulation; Definitions; Real Time Simulation, Fast time simulation; TAAM Tool; Fast Time Simulation Tools for Air Traffic System Problems, SIMMOD, Definition of air traffic system capacity problems, Analysis of traffic structure, Exportation of sample airspace and airport data to SIMMOD environment, SIMMOD modelling for air traffic flow, SIMMOD outputs, Analysis of outputs.

HTK604 Aviation Safety Management Application 3+0 7.5

Basic Concepts: Safety Culture; Basic Safety Management Rules and Procedures; The Effects of Safety Management Applications on Operators; Incident and Accident Investigations; Safety Policy: Policy Statement; Organizational Structure and Procedures; Safety Promotion: Culture; Training and Communication; Risk Management: Risk Identification; Risk Mitigation; Risk Assessment; Human Factors and Error Models; Safety Assurance: Internal and External Audits; Corrective Actions; Assessment of Safety Management Efforts.

HTK605 New Concepts and Visions in Air Traffic 3+0 7.5

Related Literature of Air Traffic Management, Literature databases, Projects, ATM research and development seminars; Milestones of Air Traffic Management; The Structure of Modern Air Navigation System; New Projects and New Concepts, SESAR, Next-gen; The Problems Classifications of Air Traffic System; Technical Solutions of Airspace Management and Airport Design, Solutions of flow management, Airspace management strategies

HTK606 Advanced Aircraft Controls and Navigation II 3+0 7.5

Introduction to Aircraft Dynamics, Basic principles, General Equations of Unsteady Motion, Longitudinal stability, Lateral stability; Navigation, Navigation techniques; Evaluation of real traffic environment, Aircraft Control, Open and Closed Loop Controls, Effects of Human Pilots; Advanced Aircraft Dynamics and Simulation Models, Analysis of current models; Sample Application for Each Students; Real time simulation for sample models; Real Time Trajectory Generation and Analysis; Conflict Detection and Resolution Models.

HTK607 Measuring of Quality and Costumer Satisfaction in Air Traffic Control Services 3+0 7.5

Basic Concepts: Service, Air traffic control services, Quality, Customer; Service Quality: Significance of Measuring Service Quality, Models in measuring of service quality, Total perceived service quality, SERQUAL, SERVPERF; Customer Satisfaction: İnner Customer, Customer, Customer loyalty, The relationship between satisfaction and quality; Measurement Technics: Methods of Accepted All Over the World, Use of scales, Making of scale and assessment.

HTK609 Air Traffic Management and Environment 3+0 7.5

Fundamental Combustion Thermodynamics; Emission Types: NOx, HC and CO; Greenhouse Gases; Contrails; Emission Mechanisms; Emission Regulations; Emission Inventory Investigations: ICAO, SAGE, AERO2K, DLR; Emission Measurements; Emission Abatement Techniques in Engines; Emission Analyses with Flight Data; Engine Power and Emissions; Effect of Flight Phase on Emissions: Cruise, Climb, Descent; Emission Estimations Based on Airport; Effects of Continuous Descent Approach on Aircraft Emissions and Fuel Consumption; Noise.

HTK610 Cost Analysis in Air Traffic Management 3+0 7.5

Concept of Air Traffic Management; Developments and Innovations in Air Traffic Management in the World and Turkey; Place of Air Traffic Management in Air Transport; Service Principles in Air Traffic Management; Air Traffic Service Providers and General Features; Costs of Air Traffic Service Providers; Air Traffic Service Charges; Users and Customers in Air Traffic Management; General Characteristics of Air Traffic Management Users; Economic Characteristics and Cost Structures of Air Traffic Management Users; The Impact of Air Traffic Management on User Costs; Efforts to Reduce Costs Related to Air Traffic Management.

HTK611 Artificial Intelligence Applications in Air Traffic Control 3+0 7.5

Definitions and Introduction; Concept of Artificial Intelligence; Artificial Intelligence Tech-nologies; Expert Systems; Structure of Expert Systems; Artificial Neural Networks and Learn-ing; Multilayer Perceptron; Artificial Neural Networks Applications; Genetic Algorithms; Functioning of Genetic Algorithms; Fuzzy Logic; Artificial Intelligence Applications for Air Traffic Control Systems; Neural Network Applications for Air Traffic Control Systems; Ge-netic Algorithm Applications for Air Traffic Control Systems.

HTK613 Universal Design in Air Traffic Control 3+0 7.5

Definitions; Introduction to Universal Design; History of Universal Design; Related Concepts and Definitions; Equitable Use; Flexibility in Use; Simple and Intuitive Use; Perceptible In-formation; Tolerance for Error; Low Physical Effort; Size and Space for Approach and Use; A Community of Learners; Learning Climate; Applications; Universal Design Approach for Air Traffic Control Systems; Analysis and Discussions.

HTK615 Critical Questioning in Air Traffic Control 3+0 7.5

Definitions and Aims; Introduction to Critical Thinking, History of Critical Thinking; Founda-tions of Critical Thinking; Creative Thinking; Higher-Order Thinking; Reasoning; Problem Solving; Decision Making; Analysis; Synthesis; Evaluation; Socrates Questioning; Decision Making Structure for Air Traffic Control Systems; Problem Detections and Solution Methods; Analysis of Solution Methods; Evaluations.

HTK692 Seminar 3+0 7.5

HTK790 Thesis 0+1 30.0

HTK890 Thesis 0+1 30.0

HTK890-0 Thesis (Thesis Proposal) 0+1 30.0

İÇT503 Design Theory I 2+0 7.5

The Design Concept; Design history, The Historical requirements, the contemporary formation The periodical Design, Knowledge, the knowledge theories, Design. The technical-technological relations, Design periodical Levels, Bauhaus and The faults, The Deficiencies. London Design Conference; Design-Art Conflict Design Theories; Dialectic Design, Pragmatics, Performance Tree Theory, Indicator Science Theory, Analytical Theories, Traditional Theories, The Basic Concept of The Design; The period the quantity , the quality, The phenomenon, the concept, the content, the abstract, the abstraction, the inspiration, the inversion. The creative, the aesthetic object, the aesthetic exceeding, The entropy, Eeurytm. The Design-Site Requirements; The Design-Ecology, The Design-Usefulness The Site; The past, the present, the future-Designs.

İÇT504 Design Theory II 2+0 7.5

The analysis of the design period. The Design Steps; The problem, the Procedure and the method related to the problem. Collecting Again; The Research and the Sources Finding. Designing. Intellectual Animations, the Intellectual Simulation Techniques, Finding-Inspiration. Inspiration Finding Methods; Model (Design Summery), Model Development, Decision-Production; Perception Concept, General Approaches, Jung Concept, Freud Concept, Pavlov Concept, Gestalt Concept. Inventional Methods; Analogies, Brain Discussion, Synectic Technique, Lateral Technique. Design and Modern Trends; Performance, Happenings, Process Art, Action Art, Installation, postmodernism and design.

İÇT507 Furniture design and Conceptual Approaches 3+0 7.5

Different design methodologies on furniture design. Relation between designer-user-manufacturer according to manufacturing process. Interface between user and space.

İÇT513 Design Studio I 3+0 7.5

Forming a Design Problem that is Caused by Special Conditions with Different Reasons, Independents From Space, Time and has a Theoretical Base; Analyzing this Design Problem through Different Approaches and Theories that would be Gotten by Literature Researches; Developing Proposal for Solution to this Defined Design Problem through a Contemporary Approaches; Computer Aided Design and Presentation.

İÇT514 Design Studio II 3+0 7.5

Forming a Design Problem through an Approach that Criticises Present Physical Environment, Defines Strong Spatial Relations; Analyzing this Design Problem through Different Approaches and Theories that would be Gotten by Literature Researches; Developing Proposal for Solution to this Defined Design Problem through Contemporary Approaches; Computer Aided Design and Presentation.

İÇT517 Professional Ethics 3+0 7.5

Definition and Fundamentals; Ethics in Society and Universal Values; Definition of Social Responsibility; Ethics in Interior and Furniture Design: Ethical Values in Design Process, Ethical Values in Application Process, Ethical Values in Among Colleague; Privacy: Privacy and the Sanctity of Private Lives; Ethics in Visual and Print Media for Interiors; Principles in Professional Ethics.

İÇT518 Continuity in Interior and Environmental Design 3+0 7.5

The concept of sustainability: Reasons, which make this concept; change in the public sense, change in the physical conditions and the reflections of these to the design. The need of sustainability in the physical environment; theories of urban design, Heiddeger and the philosophy of architecture, Shultz and the theory of place, Lynch and the image of the city. The lesson will be supported with research, develop and evaluate in Eskisehir example.

İÇT519 Phychology and Space 3+0 7.5

Psychology-Space Relations; Need to Territorial Space, Personality-Identity, Personal Distance, Social Distance, Territory, Privacy, Psychology of the User: Space Effects People, Examples on the Topic, House, Sacred Place and Working Space, Commercial Spaces; Analysis of Different Spaces and Users on this View; Psychology of the Designer, Different Designers and Their Approach.

İÇT521 20th Century Interior Design History 3+0 7.5

Industrial Revolution and social-economic and technological changes in this period. Modernism (1856-1914) Avant-Garde (1915-1933)- Art Deco (1925-1945) After War Period (1945-1960) Anti Design Period (1965-1976) Postmodernism and infhences of these periods on interior design.

İÇT524 Human/User Centered Space Design 3+0 7.5

Contemporary Approaches to the Concept of Design: Origin of design, Historical overview of the perception of design; Design as a Process; Design Thinking: Design thinking in the historical process; Elements of Design Thinking; Human/User-Centered Design: User experience; Design Experience; Contextual Analysis of Factors Affecting the Experience; Designing Experience Environments: Analysis of theoretical approaches and case studies concerning experience environments.

İÇT525 Material Design 3+0 7.5

Main Concepts of Material Design: Material, Component, Structure; Use of Materials in Interior Design: Finishing, Lighting, Equipment, Furniture; Material Types: Organic materials, Inorganic materials, Composite materials; Material Relations: Material and functionality, Material and aesthetics; Design Approaches: Modular design, Hybridization, Functional improvement, Aesthetical improvement; Techniques in Material Design: Molding, Forming, Subtraction, Addition, Multiplication, Disassembly, Compacting, Curing, Melting, Finishing.

İÇT527 Computer Aided Manufacturing and Practice 3+0 7.5

Brief History of Computer Aided Design and Computer Aided Manufacturing; Methods in Computer Aided Manufacturing: Additive, Subtractive, Forming; Computer Aided Manufacturing Tools: Domains of use, Laser cutters, Water jets, Mechanical drillers and cutters; Rapid Prototyping: FDM machines, SLS machines; Design Approaches to Computer Aided Manufacturing: Sectioning, Tesselation, Folding, Forming, Contouring; Design Software for Computer Aided Manufacturing; Materials for Computer Aided Manufacturing.

İÇT528 Composite Material Technology 3+0 7.5

Research of Wooden Composite Materials Used in Interior Spaces; Plates produced by making wood chips or small-sized strips, Plates produced by transforming wood into fiber; Research of Plastic and Wood Composites: Examination of Layered Composite Materials: Examination of Laminated Composites: Test Techniques in Composite Materials: Production Regulations of Carbon Composite Materials: Use and Research of Bearing Wood Composites in Building Sector: Investigation of Adhesives and Binder Technologies Used in Composite Production: Concrete in Construction Sector and Its Application Areas: Investigation of Production Technology of Ceramic Matrix Composites.

İÇT529 Design Studies 3+0 7.5

Design Problems; Design and Design Processes: Designer approaches to solving design problems, Innovative design methods; Design and Innovation relationship; Design Thinking; Empathise, Define, Ideate, Prototype, Test; Designer Responsibility; Social Responsibility Dimension of Design; Design Management: Criticism in the fields of design management, development of communication language used by management and design fields, interdisciplinary design management and decision making ability.

İÇT531 Interior Space 3+0 7.5

Interior Space Ergonomics: Lighting Methods; Design Problems; Design and Design Processes: Designer approaches in solving natural lighting problems, Innovative design methods in artificial lighting; Relationship between Anthropometry and Design: Kitchen Ergonomics: Relationship between Material Size and Ergonomics: Relationship between Noise and Acoustics in Interior Space: Furniture Ergonomics and Design Dimensions: Total Quality Management and Ergonomics: Office Design and the Concept of Ergonomics: Criticism of existing offices, Examination and interpretation of open office designs: Ergonomic Studies Related to Community and Space Psychology in the Pandemic Period.

İÇT552 Corporate Identity and Space Design 3+0 7.5

Identity, Perception and Meaning Concepts; Symbolic Aesthetics and Expansions; Corporate Identity: The concept of corporate identity, The importance of corporate identity, Development of identity, Applications in the historical process, Corporate image and strategy; Brand and Space Experience; Reflection of Corporate Identity to Visual Identity: Visual application guides, Place identity, Architectural and interior design identity; Commercial Space Analysis: Commercial spaces offering service, product and experience.

İÇT592 Seminar 3+0 7.5

İÇT601 Design Researches Workshop I 3+0 7.5

Conceptual, And Theoretical Approaches To Design Concept: Historical view to fundamental questions of the design; Interdisciplinary relations, and interactions, Intellectual infrastructure of the design, Problems And Expansions To Be Occurred In The Near Future: Critical readings, Making infrastructure to an article via researching, determining, and evaluating design problems.

İÇT602 Design Researches Workshop II 3+0 7.5

Interaction of technology, and design concepts: Interaction of technology and human, design concept, development process of the design and usage of the technology for the application, New Tendency On The Design: New concepts, approaches, and production facilities, Making infrastructure to an article via researching, determining, and evaluating design problems.

İÇT603 Spatial Relationships and Interfaces 3+0 7.5

Theoretical approach on space and relations: Researching relationships between humans and relationship between places together through sociology, Relation, contradiction and harmony concepts; Reading of existing physical environment and place: Interdisciplinary different approaches and different readings, Historical and cultural continuity concepts and contributions of historical process to spatial reading, Requirements of multi-aspect readings; spatial relationship and spatial continuity: Different dimensions of spatial relationship, Concepts of spatial continuity and innerface at different scales, All innerfaces from scale of city to interior spaces, places, doors, windows, walls, halls,city walls, streets, avenues, etc.; Importance of spatial continuity and concept of integrated design at the spatial design,Importance of evaluating the interior design with these approach; Supporting this lesson with visual material and studies that are made by students through decisions and evaluations at the different scales.

İÇT605 Globalisation, Identity and Design 3+0 7.5

Culture as a dimension of globalisation. Importance of the culture in terms of the globalisation. Making infrastructure of the globalisation in the process of the Modernism-Postmodernism. Global culture and efficiency of the design. Importance of the global ethic, social ethic, cultural ethic in the design process. Culture-Identity and Design relations. Effects of the globalisation from personal identity to social identity and identity problem on design approaches.

İÇT606 Aesthetic Criticism on Interior Design 3+0 7.5

Appreciation judgement and norms (emotional, subjective, enjoyment, like), Value judgment and norms (social, objective), Reflection (Success at the reflecting truth, Success at reflection effect.), Expression (Success at expression and transfer, Orginality, Sincerity, The power of the dream, Social, moral value of the reflex.), Aesthetic (Limitation with religious, moral, political, traditional values, limitation with only aesthetic.), Formal criticism, "New criticism" on Interior Design, Criticism in terms of design principles. (Balance, unity, wholeness, harmony, domination, reconciliation, originality.) Constructivist criticism (personal constructivism, social constructivism), Postmodern criticism (Postmodern information "chaos", Postmodern present, "Endness", Postmodern constructivism, "Isolation", Criticism of Noncriticism, ?Aesthetic and Nonaesthetic? dimensions and criticism.

İÇT607 Earthquake Security and Space Design 3+0 7.5

Living With Earthquake Consciousness: Earthquake security and space design; Nonstructural damages and life safety, Historical analysis based on concepts of spatial relationships and innerfaces, and house to reduce the nonstructural damages: Houses in ancient settlement, Houses in traditional Turkish city settlement, The effects of westernization period on the house space design and its usage, Changings on houses in the period of the republic, evaluation, conclusion, and suggestions for making data to the design problem.

İÇT609 Analytical Approach on Interior Design 3+0 7.5

Analytical Method: Definition, Process, Approaches in the historical process, Fields of the usage and the technics; Part-Whole with time, flexibility, structural component, short-term transformations, analysing of evolutionary long-term nontransformation principle, Analytical Evaluation Of The Visual And Spiritual Approaches On Interior Design; Analysing and Evaluating data.

İÇT611 Consumption and Design 3+0 7.5

Relationship between Production, Consumption and Design: Effects of production on design, Effects of consumption on design, Effects of design on consumption; Relationship between Producer, Consumer and Designer: Common design, Custom design, User design; Production Types: User production, Custom production, Mass production; Relationship between Consumption and Needs; Relationship between Consumption and Marketing; Need for Change in Products: Consumer trends, Market trends; Product Life Cycle: Production, Consumption, Disposal; Alternative Methods in Product Change: Repair, Do it yourself, Design it yourself, Reuse, Upcycle, Recycle.

İÇT612 Formation of Determination of Semantic Quality in Interiors 3+0 7.5

Interior Space: Definition, Components, Physical and semantic limitations; Semantic Subjectivity and Objectivity; Psychological Factors on Social and Cultural Body; Developing New Methods in Interior Design; Use of New Methods in Data Analysis.

İÇT613 New Museology-Cultural Heritage and Museum Space Design 3+0 7.5

Conceptual Change of Museum and Its Definition in the Historical Process: The concept of new museology: current expansions of museology science; Contemporary Museum and Its Relations with Cultural Heritage: Concepts of tangible and intangible cultural heritage and their effects on museum space design; Diversity of Interventions for Adaptations of Cultural Heritage Buildings to Contemporary Museum Function; Designing Museum Space as an Experience Environment: Design input for the museum space; Changing Design Approach for Museum Space from Modern to Postmodern Period: Characteristics of the concept of postmodern museum and analysis of other innovations related to understanding of contemporary museum.

İÇT615 Lighting Design and Technology 3+0 7.5

Definition of General Concepts of Interior Lighting Technology: Lighting Arrangements; Designer approaches in solving natural lighting problems, Innovative design methods in artificial lighting; Relationship between Lighting and Design: Effective Use of Lighting and Energy: Relationship between Visual Comfort and User: Relationship between Lighting and Sustainability in Interiors: Lighting Ergonomics and Design Measures: Design of Technical and Aesthetic Lighting Arrangements: Office Lighting and Application Designs: Kitchen Lighting and Criticism to Existing Designs: Use and Interpretation of Natural Lighting Technology with Sustainable Techniques: Light Pollution.

İÇT616 Bending Furniture Design and Manufacturing Technology 3+0 7.5

Definition of General Concepts of Bending Furniture: Bending Furniture Regulations; Using the steaming method, using lamination technology; Mechanical Properties of Bending Furniture: History of Bending Furniture and Its Effects in Our Country: Types of Solid Wood Used in Bending Furniture Technology: New Design Approaches in Bending Furniture: Design Analysis in Bending Furniture Examples Made in the 1900s: Modularity and Sustainability in Bending Furniture: Preparing a New Bending Furniture Design.

İÇT621 Housing and Changing Boundaries of the House 3+0 7.5

Home, House and Housing; Forces Determining the House Form: Physical Forces, Social Forces; House and its environment; Boundary and the house, Inside-outside, inside-inside relationships, Historical development and borders; Conditions of Modernity: House and housing during the first half of the 20th century, House and its changing boundaries, Period samples; Modern Movement in Turkey: Changing relationships different examples of the period, Bahçelievler sample; Literature Studies and Spatial Analysis with Students.

İÇT692 Seminar 3+0 7.5

İÇT790 Thesis 0+1 30.0

İÇT890 Thesis 0+1 30.0

İÇT890-0 Thesis (Thesis Proposal) 0+1 30.0

İNŞ503 Advanced Foundation Engineering 3+0 7.5

Subsurface Exploration; Retaining Walls; Sheet Pile Walls; Braced Cuts; Piles for Lateral Deformation; Anchored Wall; Shallow Foundations; Footing; Mat Foundations; Deep Foundations; Pile Foundations; Drilled-Pier and Caisson Foundations; Foundations on Difficult Soil; Reinforced Earth Structures; Soil Improvement Techniques.

İNŞ504 Soil Modeling 3+0 7.5

Introduction to Soil Modeling; Stress; Stain And Effective Stress; Elastic and Plastic Deformations; Yielding; Hardening and Plastic Flow; Ideal Elastic Behavior; Least-Plastic Behavior; Equilibrium and Compatibility; Relationships Between States of Stress and States of Strain; Two Dimensional States of Stress; Mohr's Circle of Stress; Principal Planes and Principal Strain Paths and Invariant; Elastic-Plastic Constitutive Modeling Soils; Soil Plasticity, Failure Criteria; Cauchy Elasticity and Modeling; Hyper Elasticity and Modeling; Critical State Model.

İNŞ505 Slope Stability Analysis 3+0 7.5

Introduction to Slope Stability; Sampling and Laboratory Testing For Studies of Slope Stability; Field Assessment of Slope Stability; Methods of Stability Analysis; Slope Instrumentation and Monitoring; Types of Instrument; Planning and Design of the Monitoring Systems; Improvement of Slope Stability; Unloading; Buttressing; Drainage; Reinforcement; Retaining Walls; Vegetation; Surface Slope Protection; Soil Hardening; Rock Slope Stabilization Methods.

İNŞ508 Stochastic Methods in Hydrology 3+0 7.5

Principles of Probability Theory; Determination of Probability of Coincidence Events; Distribution of Variability Coincidence; Distribution of Frequencies; Principles of Statistics; Probability Distribution Function; Sampling Distributions and Statistic Hypothesis; Control of Hypothesis; Correlation and Regression; Hydrologic Processes; Classification of Stochastic Processes; Models of Flow Series; Stochastic Methods of Conservation Reservoir

İNŞ509 River Hydraulics 3+0 7.5

Channel Flow and Its Classifications; Description; Types of Flow; River Morphology and Regime; River Survey; Open Channel and their Properties; Kind of Open Channel; Channel Geometry; Geometric Elements of Channel Section; Velocity Distribution in a Channel Section; Energy and Momentum Principles; Energy in Open Channel Flow; Specific Energy; Specific Force; Critical Flow; The Section Factor for Critical Flow Computation; Control of Flow; Flow Measurement; Flow Measuring Structures; Basic Parameters of Two-Phase Flow; Properties and Motion Forms of Fluid and Sediment; Dimensionless Parameters of Two-Phase Flow; Determination of Discharge of Bed Load; Suspended Load and Total Sedimentation; Sand Waves.

İNŞ510 Economic Analysis of Engineering Systems 3+0 7.5

Goals of Engineering Economy; Usage of Resources; Basic Concepts of Engineering Economy; Determination of Choices; Unknown's And Risk; The Effect of Time at Engineering Economy; Parameters of Economic Analysis; Principles of Economic Comparison; Benefits; Determination of Benefits; Expenses; Environmental Impact Assessment; Studies of Environmental Impact Assessment; Optimization; Decision.

İNŞ511 Flood Control 3+0 7.5

Flood Types; Historical Information About Floods; Damages and Losses Brought About By Floods; Relation Floods to Time; Flood Warnings; Remedies of Defense From Floods; Mathematical Modeling of Floods; Rainfall-Runoff Analysis; Infiltration Models; Hydrograph and Derivation of Unit Hydrograph; Flood Routing Trough Reservoir and Channels; Design of Spillway; Flood Measurement; Economic Analysis of Flood Control Project.

İNŞ513 Dams 3+0 7.5

Introduction; Aims of Dams Construction; Hydrology in Dams; Element of Dam Engineering; General; Embankment dam and Types and Characteristic; Concrete Dam Types and Characteristic; Spillways; Outlets and Ancillary Works; Site Assessment and Selection of Dam Type; Load on Dams; Dam Outlet Works; Introduction; The Design Flood; Flood Routing; Sedimentation in Reservoirs; Cavitation; Gates and Wolves; Classification of Gates; Crest Gates; Hydrodynamic Forces Acting on Gates; Spillway; Motion of the Sediment in Dams; Properties of Rock in Foundation; Estimation of Dam Reservoirs Volume.

İNŞ514 Planning and Design of Dams 3+0 7.5

Introduction; Classification of Dams; Parts of Dams; Planning of Dams; Feasibility Study; Planning Study; Construction of Dams; Evaluation of Time Schedule and Required Equipment; Diversion of River Flow; Foundation Treatment; Concrete Gravity Dams; Stability Criteria; Forces Acting on Gravity Dams; Arch Dams; Type of Arch Dams; Design of Arch Dams; Buttress Dams; Design of Buttress Dams; Effect of Dams to Environments and Ecology; Sediment in Dams; Dam Geology; Dam Foundations; Derivation; Outlet Structures; Spillways; Dams Models; Heightening of Dams; Maintenance and Operation of Dams; Measurement Made on Dams and Failure of Dam.

İNŞ519 Water Resources Systems 3+0 7.5

Water Resources; Introduction; Historical Perspective on Water Resources; A Perspective on Earth and Universe; Water in the Earth Atmosphere System; Principles of Flow of Water; Water Economics; Water Law; System Analysis; Uncertainty and Reliability Analysis; Water Resources Quality; Water Quality; Lakes and Reservoirs; Groundwater; Wetland; Water Resources Supply System; Surface Water Resources System; Groundwater System; Water Treatment System; Water Distribution; Wastewater Collection Systems; Irrigation Systems; Importance of Water Resources Development; Sources of System and System Analysis; Cost-Benefit Analysis; Classical Optimization Methods; Linear Programming; Dynamic Programming; Simulation Sampling Methods; Multi-Purpose Programming; Decision Theory; Cost-Benefit Analysis According to Project Objectives and Feasibility Study.

İNŞ520 Advanced Groundwater Hydrology 3+0 7.5

Definitions and Equations of Groundwater Flow; One and Two Dimensional Steady Groundwater Flows and Their Analytical Solutions; One Dimensional Unsteady Groundwater Flows and Their Analytical Solutions; Numerical Solutions of Flow Equations: Finite Difference and Finite Element Methods; Unsaturated Flows Well Hydraulics; Introduction to Groundwater Contaminant Transport.

İNŞ522 Matrix Methods for Computing Structural Systems 3+0 7.5

Structural Analysis Versus Actual Response; Principle of Virtual Displacements; Principal of Virtual Forces; Betti's Law; Influence Coefficients. Force and Displacement; Transformations; Transformations of Member Flexibility and Stiffness; Fixed end Forces; Automated Matrix Displacement and Force Methods of Structural Analysis; Releases; Substructures; Nonlinear Analysis; Introduction To Finite Element Method (R).

İNŞ526 Construction Management 3+0 7.5

General Definitions and Introduction to Construction Management; Organizations of Construction Companies; Construction Field Management; Organization and Documentation; Project Management and Organization; Project Planning; Resource Analysis and Resources Management; Construction Machinery Usage; Internal Project Communication; Risk Management; Construction Bankruptcy; Construction Contract Systems and Type of Construction Contracts; Disagreement and Resolving Methods; Labor Relations and Labor Safety.

İNŞ528 Construction Cost Analysis and Estimating 3+0 7.5

Introduction to Construction Cost; Bidding Legislation: Bidding law and Applications; Bidding Types; Qualification for Projects; Preparing Optimum Bid Proposal; Bid Bond; Performance Bond; Exact Ending Cost; Project Acceptance; Punishment Application; Blueprint Reading; Quantity Takeoff; Estimate Application; Bidding Information Systems; Computer Based Bidding Management; Relationship Between Cost and Productivity; Cost Estimate Data Base Management.

İNŞ531 Contract and Cost Management 3+0 7.5

Introduction to Contract Management; Turkish Construction Contract Law; Construction Contract Evaluation; Contract Strategy; Contract Documents; Contract Selection; Contractor Rights; Effect Factors for Decision Support Level; Contract Types; Build Operate Transfer; Design Build Operate Transfer and Finance Build Operate Contract Applications; Resolving Methods for Contract Conflicts; Court Decisions; Contract Risk Evaluation.

İNŞ536 Law in Construction Projects 3+0 7.5

Introduction to Law in Construction Sector, Origins of the Construction Disputes, Construction Claims, Categories of Construction Problems, Resolution of Disputes, Productivity Dispute Relations, Disputes Arises From Project Change Orders, Reflections of Disputes to Parties.

İNŞ539 Introduction to Finite Elements 3+0 7.5

Approximate solution methods: Finite Difference, Finite Element Construction the solution by the Finite Element Method One and Two dimensional problem applications Time dependent one dimensional problems Introduction to nonlinear and three dimensional problems.

İNŞ540 Advanced Highway Materials 3+0 7.5

Nature, Sources And Uses of Bituminous Materials; Production And Classification of Asphalt; Detailed Analysis of Chemical Composition of Asphalts; Chemical And Physical Properties of Asphalt; Tests On Asphalt; Rheology And Behavior of Asphalt; Classification And Properties Of Mineral Aggregates; Tests On Aggregates; Calculation Methods For Aggregate Mixes; Types of Asphalt Aggregate Mixtures And Their Uses In Pavements; Significant Properties And Design of Asphalt Aggregate Paving Mixtures; Modified Asphalt Mixtures; Surface Treatments; Intensive Laboratory Studies And Field Application;

İNŞ541 Advanced Pavement Design 3+0 7.5

Theories, Principles And Practice In The Structural Design And Construction of Highway And Airport Pavements Including Stabilization Techniques; Pavement Types, Wheel Loads And Design Factors; Stresses In Flexible Pavements; Stresses In Rigid Pavements; Vehicle And Traffic Consideration; Climate, Environment; Materials Characterization; Sub grades; Bases And Sub bases; Bituminous Surfaces; Design of Pavement Evaluation Performance Evaluation Surveys And The Design of Asphalt Mixtures; Rigid Pavement Design; Design of Flexible Airport Pavements; Design of Flexible Highway Pavements; Design of Rigid Airport Pavements; Design of Rigid Highway Pavements; AASHTO Design Methods; Shell Method.

İNŞ542 Neural Network Applications In Transportation Engineering 3+0 7.5

Formal Definition of Artificial Neural Networks; Simple Introduction To Neural Networks; Types of Artificial Neural Networks; Application Fields of Artificial Neural Networks; Some Basic Neural Network Theories; Kohonen Networks; Vector Quantization And K-Means; Self Organizing Map; Learning Vector Quantization; Other Kohonen Networks; The

Architecture; That Means Layers And Neurons In Artificial Neural Networks; Back-Propagation Algorithm; Some Major Drawbacks of The Back-Propagation Algorithm; Applications of Artificial Neural Networks In Science; Special Applications of Neural Networks In Transportation Engineering; Applications of Some Computer Programs With The Related Subject; The Evaluation Techniques of These Computer Programs.

İNŞ543 Theory of Elasticity 3+0 7.5

Analysis of Stress and Strain; Fundamental Equations in Theory of Elasticity; Stress Problem; Displacement Problem; Compatibility Conditions; General Theory of Plane Elasticity; Plane Stress (Thin Plate Problem); Plane Strain (Long Cylinder Problem); Solutions in Cartesian Coordinates; Stress Functions; Airy Stress Function; Boundary Conditions; Polynomial Solutions; Biharmonic Functions; Examples: Fourier Series Solutions; Examples: Solutions in Polar Coordinates; Examples.

İNŞ544 Structural Dynamics 3+0 7.5

Seismic Hazards; Structural Deficiency; Soil Effects; Capacity Demand Concept; Step by Step Nonlinear (Pushover Analysis); Plastic Hinge Demand; According to FEMA 356; Response Spectra; Performance Point; Evaluation Procedure A;B And C; Retrofit.

İNŞ545 Advanced Structural Analysis 3+0 7.5

Fundamentals of Flexibility Method: Joint displacements, Member end-actions and support reactions; Flexibilities of Prismatic Members; Formalization of Flexibility Method; Stiffness Method; Temperature Changes; Restraint and Support Displacements; Stiffness of Prismatic Members; Stiffness Matrices; Load Vector; Application to Plane Frame and Plane Truss Members; Additional Topics for Stiffness Method.

İNŞ546 Theory and Design for Tests and Measurements on Construction Materials 3+0 7.5

Introduction, needs for tests and measurements, types and basic properties of construction materials, design for testing and measurement, types of tests on structural materials; standard, destructive, semi-destructive, and nondestructive methods, evaluation of test results, relevant standards and specifications.

İNŞ547 Urban Hydrology and Hydraulics 3+0 7.5

Urban Climate; Hydrological Consequences of Urbanization; Design Hyetograph; Rainfall Losses: SCS method, Green and Ampt method; Rational Method; Overland Flow; Hydraulic Routing; Overview of Important Computer Models.

İNŞ548 Applications of Geosynthetics 3+0 7.5

Introduction; Basic Information on Geosynthetics; Geotextile Functions: Properties and test methods; Road and Railway (separation) Applications: Filtration, Drainage and erosion control applications; Soil Reinforcement Applications; Geomembranes;

İNŞ549 Deep Excavations and Retaining Structures 3+0 7.5

Earth Retaining systems for deep Excavations; Water Pressure Acting on Earth Retaining Systems and Related Problems; Lateral Earth Pressure Acting on Earth Retaining Systems; Lateral Supporting Elements: Ground anchors and struts, Types, Components, Production and installation, Dimensioning, Bearing capacity, Corrosion protection, Testing and pre-stressing anchors; Lateral and Vertical Displacements of Adjacent Ground; Modes of Failure of Retaining Systems; Sloped Excavations in Soil and Rock; Instrumentation and Monitoring of Deep Excavations; Soil Nailing: System description and design.

İNŞ551 Repair and Strengthening of Structures 3+0 7.5

Introduction; Assessment, Evaluation and Classification of Damage; Earthquake Damages: Wall damages, Slab, Beam, Column, Beam-Column Connections, Shear Wall and Foundation; General Principles of Repair: Repairing of Structural Elements; Repair and Strengthening Materials; Surface Preparation and the Use of Repair Mortars; Repair and Strengthening By Using Shot Crete, Epoxy Resin, Steel Plates and Carbon Fiber Reinforced Plastics; General Principles of Strengthening; Design of Strengthening Elements; Jacketing of Columns; Additional Shear Walls; Strengthening of Foundations; Strengthening Details of Structural Element; Repair and Strengthening of Masonry Structures; Rehabilitation of Structural Systems; Evaluation of Earthquake Safety of Available Structures.

İNŞ552 Advanced Railway Design 3+0 7.5

Rail transport systems; Types and features of rolling stocks; Generalized equation of train?s motion; Propulsion resistances; Stages of train movements, acceleration, cruising and deceleration; Track layout and geometry; Sub grade and Drainage; Railway superstructure, sub-ballast, ballast, sleepers, rails and fastenings; Load distribution and wheel-rail interaction; Type of track cross-sections; Expansion and dilatation of rail; Railway track capacity; Advances in railway technology, high-speed rail, ballastless track system, ?smart? systems for vehicle and track health monitoring, advances in propulsion and energy sources, noise and vibration controls.

İNŞ553 Advanced Highway Design 3+0 7.5

Highway Systems; Characteristics of Vehicles and Drivers; Characteristics of Traffic; Climbing Lane Design; Geometric Characteristics of Highways: Route choice, Sight distance criterion, Zero Line application, Compound and reverse curves, Horizontal alignment; Special Applications About Transition Length and Super Elevation; Transition Curves; Spirals; Vertical Alignment; Cross Section Elements; Cross Section and Volume Calculations; Special Applications about Mass Diagrams; Cost of Hauling; Introduction to in Roads Software and a Basic Application; Types of Pavements; Properties of Asphalt Concrete; Properties of Portland Cement Concrete; Pavement Thickness Designation: AASHTO 2002 Design Methods (Flexible And Rigid), Other Pavement Design Approaches; Properties of Asphalt Concrete; Surface and Subsurface Drainage; Culvert Design.

İNŞ554 International Construction Project Management 3+0 7.5

Globalization; The Structure of the International Construction Industry; International Strategic Alliances; International Construction Project Finance; International Standards; FIDIC Contracts; Disputes and Resolution Methods; Risk Management in International Construction Projects; Cultural Differences in International Construction Projects; Human Resources Management in International Construction Projects; Models Used in Multi-National Companies; Project Management in different Countries; Case Studies.

İNŞ555 Advanced Concrete Technology 3+0 7.5

Introduction; Concrete Making Materials; Cements; Types of Cements; Portland Cement; Aggregates; Admixtures; Mixing Water; Concrete Casting; Cold Weather Concrete; Hot Weather Concrete; Mass Concrete; Roller Compacted Concrete; Self-Compacted Concrete; Preplaced Aggregate Concrete; Underwater Concrete; Geopolymer Concrete; Fiber Reinforced Concrete.

İNŞ556 Plastic Design of Steel Structures 3+0 7.5

Introduction to Limit States Design; Comparison with Allowable Stress Design; Resistance Of Cross-Section Under Simple and Combined Forces; Interactions; Stability Controls; Limit Loads for Structural Systems; Mechanism and Step-By-Step Methods and Examples; Connections

İNŞ557 Soil Structures and Ground Improvement Techniques 3+0 7.5

Introduction; Retaining Structures; Earth Pressures; Effects of External Loads; Rigid Support Systems; The Mechanics and Construction of Reinforced Earth; Flexible Retaining Structures; Anchors; Calculation of Steel And Shot Crete Retaining Structures; Deep Vibro Techniques; Dynamic Compaction; Cement Grouting; Jet Grouting; Compaction Grouting; Lime And Lime/Cement Columns; In Situ Soil Mixing.

İNŞ558 Hydrology of Floods and Droughts 3+0 7.5

Hydrology of Floods: Introduction, The factors affecting flooding, rainfall-runoff relationships, methods of flood forecasting, regional flood frequency analysis, the displacement of flood, flood management. Hydrological drought: Input, Low flow and drought periods, low-flow analysis, analysis of the dry period, drought management.

İNŞ559 Hydrologic Modeling 3+0 7.5

Basin delineation and determination of basin characteristics using Geographic Information Systems; Introducing hydrologic model types; Examples and computer applications; Hydrologic modeling routines; Precipitation, soil; runoff, routing; Model calibration and validation concepts; Manual and automatic calibration; Objective function, optimization; Goodness of fit tests for model performance

İNŞ560 Bituminous Mixtures Design and Technology 3+0 7.5

Selection of Aggregates and Binders for Asphalt Mixtures; Engineering Properties of Bituminous Mixtures and Their Relation to to Pavement Performance; Conventional Mix Design Methods: Marshall design method; Developments in Bituminous Mixtures Technology: SUPERPAVE mix design method; Type of Bituminous Mixtures: Asphalt concrete mixtures, Surface coating, Stone mastic asphalt (SMA), Porous asphalt pavements, Sullury seal, Mastic asphalts; Methods of Recycling Asphalt Pavement; Mixture Production and Construction; Quality Control; Pavement Performance and Management; Pavement Maintenance and Rehabilitation.

İNŞ561 Pavement Maintenance-Rehabilitation and Recycling Strategies 3+0 7.5

Flexible and Rigid Pavement Structure; Layers and Properties of Pavement; Properties of Subgrade Soil, Pavement Drainage; Pavement Distress: Definition, Development of mechanism; Preventative Maintenance Practices: Sealing cracks, Full-depth repair, Seal coating, Technology and tools, Examples of preventative maintenance program; Techniques for Reconstruction of Pavement; Recycling Pavement Materials: Recycling methods of asphalt pavements: Cold planning, Hot recycling, Hot in-place recycling, Cold in-place recycling, Full-depth reclamation.

İNŞ562 Applications of Soil Dynamics 3+0 7.5

Introduction to Soil Dynamics; Properties of Dynamically Loaded Soils: Laboratory tests, Field tests; Foundation Vibration, Dynamic Bearing Capacity of Shallow Foundations; Lateral Earth Pressure and Designing Retaining Walls under Dynamic Loads; Settlement Analysis under Dynamic Loads; Machine Foundations on Pile Foundations; Seismic Analysis of Slopes and Fill.

İNŞ563 Advances in Sediment Transport Research 3+0 7.5

Properties of Sediment; Hydraulics of Open Channel Flow; Characteristics of Turbulent Flow; Sediment Movement: State of the art in the initiation of granular material movement, Measures of sediment transport, Relationship between movable bed and turbulent flow, Up-to-date sediment transport rate calculations; Experimental Investigation of Sediment Transport in Laboratory and Field, New Methods; Interaction Between Sediment Transport and Erosion/Deposition and Details about Such Engineering Projects.

İNŞ564 Materials Science of Concrete 3+0 7.5

Introduction: Concrete components and concrete formation phases; Void Structure of Cement Paste Phase, Gel formation; Internal Structure of Hardened Cement Paste; Nano-Micro, Meso and Macro Level Approaches in Concrete; Hardened Cement Paste-Aggregate Interface and Properties; Effect of Hardened Concrete Properties of Void Structure of Cement Paste; Inner Structure Factors Affecting Concrete Properties; Fresh Concrete Properties; Hardening Concrete Properties; Hardened Concrete Properties; Mechanics and Strain Properties of Concrete; Time-Dependent Behavior of Concrete: Creep and shrinkage; Fracture Mechanism of Concrete; Concrete Fatigue; Concrete Durability.

İNŞ565 Cold-Formed Steel Structures 3+0 7.5

Introduction, General concepts; Manufacturing Process of Cold-Formed Steel; Design of Thin Planar Compression Members; Design of Cold-Formed Flexural Members; Design of Cold-Formed Members Subject to Concentric Compressional Load; Design of Cold-Formed Members Which May Be Subject to Torsional-Flexural Buckling; Design of Beam Columns, Connections; Current Design Codes for Cold-Formed Steel; Structural Behavior of Cold-Formed Steel.

İNŞ566 Similarity and Model Theory 3+0 7.5

Basic Principles of Dimensional Analysis; Dimensions and Units; Conversion of Units; Dimensional Homogeneity; Dimensional Analysis and Buckingham Pi Theorem; Dimensional Analysis and Buckingham Pi Theorem; Dimensional Analysis and Rayleigh Method; Dimensional Analysis and Rayleigh Method; Model Theory; Similarity (Geometric, Kinematic and Dynamic); Similarity (Geometric, Kinematic and Dynamic); Hydraulic Models; Hydraulic Models; Sample Applications.

İNŞ567 Experimental Methods in Advanced Fluid Mechanics 3+0 7.5

Principles of Advanced Fluid Mechanics: Hydraulics of pipe and open channel flows, Turbulent flow; Instrumentation and Techniques for Laboratory and Field Investigations of Flow Parameters: Experimental matrix and sensor selection, Principles for acquiring digital signal; Digital Signal Analysis: Exploratory data analysis, Analysis of data using probabilistic methods, Data visualization techniques, Engineering computing applications in hydraulic engineering using numerical computing software; Introduction to Numerical Modeling.

İNŞ569 Design of Composite Structures 3+0 7.5

Behavior and Design of Steel-Concrete Composite Members for Buildings: Composite slabs, Beams, Columns and frames; Methods of Analysis and Design: Plastic moment of resistance, Elastic moment of resistance, Longitudinal shear, Vertical shear, Deflection, Vibration, Crack-width control, Transverse reinforcement, Punching shear, Full and partial shear composite behavior; Behavior and Design of Shear Connectors: Ductile and non-ductile connectors; Continuous Beams and Slabs; Lateral Buckling; Connections.

İNŞ571 Geotechnical Engineering and Computer Applications 3+0 7.5

Principles of Geotechnical Engineering and Applications; Definition of Application Methods: Design Criteria, Finite Element Method; Definition of Stability Problems and Solution Methods; Shallow and Deep Foundation Design and Computer Applications; Foundation Design Under Dynamic Loads and Computer Applications; Computer Applications for Designing Various Soil Structures.

İNŞ573 Computer Programing for Structural Engineering 3+0 7.5

Introduction to Programming; Algorithm: Design, Flowcharts for algorithm; Integrated Development Environment (IDE) Programming: Program control commands, Conditional control, Loop control; Numerical Computing Environment Programming: Commands, Matrix operations, Numerical solutions; Simulation Tools; Programming with a Spreadsheet Program; Designing a Graphical User Interface; Data Sharing Between Software: Reading data from a file, Writing data to a file; Structural Engineering Applications.

İNŞ575 Rigid Pavements 3+0 7.5

Introduction: History of rigid pavements and rigid pavement applications in our country, Selection of pavement type, The pros and cons of rigid pavements; Rigid Superstructure Properties; Surface properties, Geometric smoothness, Roughness, Wheel-surface adherence; Pavement Concrete: Properties of pavement concrete, Concrete mix design; Rigid Superstructure Design: Design methods, Stress distribution, Concrete slabs, Crack prevention, Joints and filler materials; Concrete Pavement Construction; Concrete Pavement Types: With joint and jointless concrete pavement applications, Continuously reinforced concrete pavement, Porous pavement, Stone block pavement; Failures in rigid pavements, Maintenance and repair.

İNŞ577 Experimental Applications in Geotechnical Engineering 1+2 7.5

Introduction: Relationship Between Theory and Experiments; Disturbed and Undisturbed Soil Sampling; Soil Index Tests: Sieve analysis and hydrometer, Water content, Specific gravity; Atterberg limits; Soil Permeability Tests; Soil Compaction Tests; Oedometer Test; Soil Strength Tests: Unconfined compression test, Triaxial compression test, Shear box test; Introduction to Field Tests: SPT, CPT, Cross hole; Down hole, Plate load; Interpretation of results.

İNŞ592 Seminar 3+0 7.5

İNŞ605 Mechanics of Continua I 3+0 7.5

Tensors and Tensor Analysis; Strain (Coordinates, Base Vectors; Deformation Gradients and Tensors; Strain Tensors and Deformation Tensors; Strain Invariant and Principal Directions; Rotation; Area and Volume Changes); Motion (Motion; Time Rates of Vectors; Velocity end Acceleration, Material Derivative of the Element of arc; Surface and Volume; Kinematics of Line; Surface and Volume Integrals; Strain Rate); Stress (External and Internal Loads, Stress Hypothesis; Stress Tensor; Principles of Balance of Local Momentum).

İNŞ606 Mechanics of Continua II 3+0 7.5

Stress and Strain; Thermodynamics of Continuous Media (Principle of Conservation of Energy; Potential Energy and Strain Energy; Entropy; Principle of Entropy; Thermodynamics Restrictions on Elastic Solids and Viscous Fluids); Constitutive Equations (The Need For Constitutive Equations; Axioms of Constitutive Theory; Thermo mechanical Materials; Elastic Materials; Isotropic Elastic Materials; Stokesian Fluids; Thermo elastic Solids); Theory of Elasticity (Linear Constitutive Equations; Restrictions on Elastic Coefficients; Experimental Determination of Elastic Constants); Fluid Dynamics; Thermo elasticity.

İNŞ607 Soil Behavior 3+0 7.5

The nature of Soil; Bonding; Crystal Structure; and Surface Characteristics; Soil Mineralogy; Soil Formation and Soil Deposits; Determination of Soil Composition; Soil Water; Clay-Water-Electrolyte Systems; Soil Fabric and its Measurements; Soil Behavior; Soil Composition and Engineering Properties; Effective; Inter granular and Total Stress; Soil Structure and its Stability; Fabric; Structure Relationships; Volume Change Behavior; Strength and Deformation Behavior.

İNŞ611 Earthquake Engineering 3+0 7.5

Earthquake Mechanism; Spectrum Concept; Multi Degree of Freedom System; Modal Analysis in Earthquake Response; Earthquake Resistant Design; Main Philosophy of Earthquake Codes; Earthquake Codes and Design Criteria; Spectral Analysis of Structures and Simplified Approaches; Behavior of Reinforced Concrete Structures Subjected to Earthquake Ground Motion; Plastic Hinge Concept; Capacity Concept in Design; Earthquake Resistant Design; Safety to Earthquakes; Limit States; General Behavior of Structures; Structural Irregularities; Design Spectra; Elastic Equivalent Earthquake Load; Effect of Earthquake Load; Acceleration Spectrum; Ductility of Structures; Equivalent Earthquake Load; Modal Superposition Method; Structural Systems; Construction Rules for Reinforced Concrete Structures; Story Displacements; Design of Base Isolated Structures; Retaining Walls.

İNŞ614 Project Management 3+0 7.5

Introduction to Project Management and General Definitions; Project Management Responsibilities and Rights; Super Responsibilities and Rights; Project Classifications; Basic Structure of Project Organization; Organizational Work Flow; Classic Organizations; Developed Organizations; Matrix Organizations; Management Functions; Management for Employee; Managers Skills; Level and Work Definitions; Group and Team Management; Overcome Individuals Problems; Time Management; Project Planning; Comply Planning; Risk Management; Risk Identification; Evaluation; Classification; Manage; Quality Management.

İNŞ615 Quality Management in Construction 3+0 7.5

Basic Concepts and Definitions; Quality Economy for Construction Sector; Quality Movement in Construction Business; Quality Leadership; Taguchi Approach; Quality Control Tools; Six Sigma Applications; Quality Circles; Quality Strategies and Quality Management for Clients; Quality Responsibilities; Production Quality Relations; Marketing Quality Relations; Total Quality Management and Applications.

İNŞ616 Computational Hydraulics 3+0 7.5

Elements of Numerical Analysis; Introduction; Definition and General Concepts; Numerical Approximation and Interpolation; Numerical Integration; Numerical Solution of Partial Differential Equation Common in Hydraulics; Form and Occurrence of Some Partial Differential Equations; Numerical Solution of Parabolic Equations; Flow in Closed Conduits; Mathematical Models for Steady Flow in Pipes and Pipe Networks; Non Steady Flow; Open Channel Flow; Mathematical Models for Non- Steady Flow in Open Channels.

İNŞ621 Soil Dynamics 3+0 7.5

Vibration of Elementary Systems; Wave Propagation in Elastic; Homogeneous and Isotropic Soils; Wave Propagation in Soil; Elastic Waves in Layered Soils; Wave Propagation in Saturated Soils; Dynamic Properties of Soils; Soil Behavior Under Earthquake; Settlement of Soil Due to Earthquakes; Liquefaction in Soil; Laboratory and Field Measurements.

İNŞ622 Measurement of Soil Properties 3+0 7.5

Measurement of Engineering Properties of Soils in Laboratory and Field; Measurement of Shear Strength,: Compressibility and Permeability; Measurement Techniques in the Laboratory; Field Tests for Determining Shear Strength for Compressibility; Field Permeability Tests in Cohesive Soils; Basic Field Instruments in Soil Engineering and Principles of Measurement.

İNŞ623 In-situ Testing of Concrete 3+0 7.5

Introduction; Needs for Testing Concrete; Quality Control of Concrete in Structures; Types and Basic Properties of Concrete; Design for Testing; Types of Tests on Concrete: Standard tests; Cube and cylinder tests, Destructive tests; Core test, Cast-in-place cylinder test, Semi-destructive tests; Pull-out test, Pull-off test, Break off test, Penetration resistance test, Internal fracture test, Nondestructive tests; Rebound hammer test, Ultrasonic pulse velocity test; Electric Resistance of Concrete; Radar Imaging of Concrete; Evaluation of Test Results; Relevant Standards and Specifications.

İNŞ626 Cross-Cultural Management in International Construction Projects 3+0 7.5

Basic concepts of culture; Dimensions of culture; Organizational culture; National culture; High context?low context cultures; Monochronic?polychronic cultures; Cultural differences in international construction projects; Multicultural project teams in construction projects; Models used in multicultural organizations; Doing business with different cultures in construction projects; Cross-cultural communication; Cultural differences and project success in construction projects; Effects of cultural differences on management practices; Culture shock; Cross-cultural training; Cross-cultural management in international construction projects.

İNŞ627 Advanced Labor Health and Job Safety Management 3+0 7.5

Health and safety in construction; Workplace safety; Accident investigation and prevention; Occupational illnesses; Construction safety training methods; Types of construction accidents; Minor injury, major injury and fatal accident scenarios; Preparation of cartoons and animations; Investigation and analysis of construction accident statistics; Case studies.

İNŞ628 Knowledge Management in Construction 3+0 7.5

Basic concepts of knowledge; Types of knowledge; Knowledge conversion processes; Fundamentals of knowledge management; Knowledge management strategies; Knowledge management tools; Knowledge management techniques and technologies; Knowledge management systems; Success in knowledge management; Knowledge management applications; Classification of knowledge in construction industry; Knowledge management cycle in construction projects; Knowledge transfer and knowledge sharing in construction projects; Knowledge management methods of construction firms; Advantages of knowledge management to construction firms; Barriers to knowledge management in construction projects; Knowledge management applications in construction projects.

İNŞ629 Pavement Management Systems 3+0 7.5

Introduction to Pavement Management; Inventory Techniques; Distress surveys, Pavement condition surveys, Strength surveys, Friction survey, Ride quality survey; System Maintenance Strategies; Needs determination, Linear programming in pavement management; Rehabilitation and Maintenance Strategies; Priority Programming in Rehabilitation and Maintenance: Prioritization by weighting and combining, Prioritization by analytical hierarchy process; Project Selection Techniques; Project level design, A framework for pavement design, Physical design inputs; Variability, Reliability and Risk in Pavement Management System; Generating Alternative Design Strategies.

İNŞ630 Experimental and Computational Methods to Characterize Bituminous Materials 3+0 7.5

Introduction to the Design and Performance Prediction of Asphalt Mixtures; Experimental and Computational Methods Used to Characterize Mechanical Properties and Performance of Bituminous Materials; Performance Modeling at Different Length Scales, Micro and Mezzo Scale Characterization; Characterization of Mix Microstructure; Internal Micro-structure; Mechanisms of Distresses and Techniques to Characterize Distresses: Fatigue cracking, Moisture damage, Permanent deformation.

İNŞ631 Design of Seismic Isolated Structures 3+0 7.5

Introduction: Basic concepts, History of seismic isolation; Principles of Seismic Isolation: Earthquake response spectra, Effects of seismic isolation, Linear and bilinear isolation systems, Energy dissipation; Analysis Methods in Isolated Structures: Modification of response spectrum, Time history analysis method; Isolator Devices: Friction pendulum systems, Lead rubber bearings; Mechanical Properties of Lead Rubber Bearings: Effect of loading history, Effect of velocity, Heating of lead core; Design of Elastomeric Bearings: Stability of elastomeric bearings, Design of reinforcing shims, Checks for design earthquake; Testing of Seismic Isolators; Prototype testing, Acceptance criteria.

İNŞ632 Design of Ductile Steel Structures 3+0 7.5

Common Properties of Steel Materials; Plasticity; High and Low Cycle Fatigue; Material Models; Applications of Plastic Analysis (Capacity Design and Pushover Analysis); Ductile Behavior of Moment Frames Under Lateral Forces; Behavior of Beam-to- Column Connection and Their Ductile Design; Principles of Ductile Moment Frame Design; Seismic Limit State Approach; Seismic Load Reduction and Displacement Amplification Factors; Seismic Design Procedures in Modern Standards; Stability and Plastic Rotation Capacity of Steel Beams; Cyclic Beam Buckling; Passive Energy Dissipation Systems and Their Application in Structures.

İNŞ633 Hydrological Forecasting and Early Warning Systems 3+0 7.5

Role of Real-Time Flood Forecasting and Warning in Flood Risk Management, Principles and Theory Underlying Flood Forecasting Methods, Overall System Design; Hydrological Data Systems: Monitoring systems, Data collection, Data processing, Data archieving; Precipitation Forecasting: Rainfall observations, Radar, Satellite products, Models; Real-Time Flood Forecasting Methods: Empirical, Transfer function, Rainfall runoff models, Flood routing models; Uncertainty in Flood Forecasts; Early Warning Systems: Flood forecast translation, Improvements in decision support systems; Data Assimilation: Combining data from different sources, Application of Kalman and ensemble Kalman filter; Case Studies for Real-Time Flood Forecasting and Warning Practice.

İNŞ635 Seismic Performance Assessment of Buildings 3+0 7.5

Structural System: Structural members, Structural irregularities; Seismic Behavior of Buildings: Seismic hazard assessment, Strong ground motion properties, Structural damage, Non-structural damage; Structural Member Behavior: Material models, Moment curvature analysis, Interaction diagrams and surfaces; Structural Analysis: Linear elastic analysis, Modal analysis, Pushover analysis, Time history analysis; Condition Assessment: Building geometry, Member details, Material properties; Performance Assessment of Existing Buildings: Walk-down assessment, Preliminary assessment, Detailed assessment; Strengthening Methods; Component strengthening, System strengthening.

İNŞ636 Experimental Design in Geotechnical Engineering 3+0 7.5

Explanation the Systematic of Experiments; Specification of Boundary Conditions; Presentation of Instrumentation Equipment; Triaxial Compression Tests and Analysis of the Results; Shear Box Experiment and Analysis of the Results; Standard Penetration Test and Related Correlations; Plate Load Test and Pile Load Test; Other In-situ Tests; CPT, CPTu, DMT, PMT, FVT; 3 Dimensional Design and Printer Technology; Problems Encountered in Experimental Studies; Case Studies for Laboratory Experiments; Case Studies for In-situ Experiments; Design of Experimental Model.

İNŞ637 Remote Sensing and Geographic Information Systems Applications in Water Resources 3+0 7.5

Principles of Remote Sensing and Geographic Information Systems: Digital image interpretation and spatial data analysis; Mapping of Surface Water Systems; Determination of Evaporation, Soil Moisture and Snow Patterns; Hydrologic and Hydraulic Processes: Data collection, Data processing; Hydrologic/Hydraulic Modeling: Determination of flood magnitudes and flood risk zones, Developing decision support tools for water resources; Statistical Data Analysis/Uncertainty; Case Studies of RS/GIS Applications in Water Resources Management.

İNŞ639 Experimental Design in Structural Engineering 3+0 7.5

Introduction to Modal Testing; Applications of Modal Testing; Philosophy of Modal Testing; Fundamentals of Vibrations; Classification of Vibrations and Analysis Procedures; Free and Forced Vibration of Single Degree of Freedom Systems; Free and Forced Vibration of Multi Degree of Freedom Systems; Fourier Series Expansion; Fast Fourier Transform; Determination of Natural Frequencies and Mode Shapes; Vibration Measurements and Applications; Instrumentation; Data

Acquisition Systems; Digital Signal Processing, Windowing, Filtering; Modeling, Model Refinement; Structural Damages and Identification Procedures.

İNŞ642 Fluid Dynamics Simulation Based Design 3+0 7.5

Introduction To Numerical Modeling: Multi-phase flow simulations, Flow-structure interaction, Structural simulations, Dynamic mesh, Validation and Verification; Simulation-based design: Examples, Techniques used in simulation; Solvers: Open source software, Commercial software; Simulation Based Design Application: Solver selection, Determination of initial and boundary conditions, Meshing, Definition of moving solid parts in the model, Design improvement application in simulation platform.

İNŞ643 Seismic Isolator Tests, Characterization and Modeling 3+0 7.5

Introduction to seismic isolation; Isolator devices; Mechanical characteristics and modeling of isolators; Code provisions for seismic isolation; Isolator tests: Prototype tests, Production control tests; Identification of isolator properties from test results: Computation of post-yield stiffness, Computation of equivalent damping ratio, Computation of equivalent friction coefficient, Comparison of existing definitions for computations; Sensitivity of isolator characteristics to loading protocol and environmental conditions: Loading rate, Axial load level, Low temperature.

İNŞ692 Seminar 3+0 7.5

İNŞ790 Thesis 0+1 30.0

İNŞ890 Thesis 0+1 30.0

İNŞ890-0 Thesis (Thesis Proposal) 0+1 30.0

İST505 Econometric Analysis 3+0 7.5

Simultaneous-Equation Models; Simultaneous Dependence of Economic Variables; Consequences of Simultaneous Relations; Solution to the Simultaneous-Equation Bias; Identification: the Problem of Identification; Formal Rules for Identification; Identifying Restrictions; Tests for Identifying Restrictions; Simultaneous-Equation Methods; Reduced-Form Method or Indirect Least Squares; The Method of Instrumental Variables; Two-Stage Least Squares; Mixed Estimation Methods; Mixed Estimation Methods; Restricted Least Squares; Pooling Cross-Section and Time-Series Data; Durbin S Generalized Least Squares; Theil and Goldbergers Mixed Linear Estimation; The Method of Principal Components.

İST506 The Theory of Measure and Probability 3+0 7.5

Lebesgue Measure of Plane Sets; The Concept of General Measure; Extension of Measure Defined on a Semiring to a Measure Defined on the Ring; Additivity and s-additivity of Measure; Measurable Functions; The Lebesgue Integral; Stieltjes Measures; The Lebesgue-Stieltjes Integral; Classification of random Variables for Distributions: Discrete, absolutely continuous and singular distributions; Applications of the Lebesgue-Stieltjes Integral to Probability Theory: Expressions of Mathematical Expectation and Variance of Random Variables by Lebesgue-Stieltjes Integral.

İST507 Circular Data Analysis 3+0 7.5

Circular Data: Diagrammatical representation, Forms of frequency distributions, Examples of directional data; Descriptive Statistics: Measures of location, Measures of concentration and dispersion, Trigonometric moments; Circular Probability Distributions: Uniform distribution, Cardioids distribution, wrapped normal distribution, circular normal distribution; Estimation of Parameters; Tests for Mean Direction and Concentration: Single sample tests, Two and multi-sample tests; Circular Correlation and Regression: Measures of Correlation, Regression models.

İST510 Nonparametric Statistical Techniques 3+0 7.5

The Properties of Nonparametric Techniques; Usage Purposes; Utilities; Limitations; One Sample Non Parametric Techniques; Binomial Test; Sign Test; Rank Sign Test of Wilcoxon; Runs Test; Independent Two samples; Median; Mann-Whitney; Small and Large Sample Tests of Kolmogorov-Simirnov; Dependent Two Sample Tests; Sign; Rank Sign test of Wilcoxon; Mcnemar Test for Repeated Data; Kruskall- wallis Test for a Few Samples.

İST511 Advanced Regression Analysis 3+0 7.5

Regression Analysis With Matrixes and General Regression Theory and Model Validity; Regression With Dummy Variables; Analysis of Covariance; Comparison of Homogeneity of Two Regression Equations; Examining the Error Terms and Regression Problems; Transportations Used in Regression Analysis; Multiple Colinearity Problem; Biased Estimation Techniques; Ridge Regression; Non-Linear Regression; Calibration; Prediction Intervals.

İST512 Artificial Neural Networks and Statistics 3+0 7.5

Description of Artificial Neural Networks (ANN): Network Architecture, Activation Function, Training Algorithm; Simple ANN Algorithms in Sample Classification: Hebb, Perceptron Net; Some Applications: Connections with Regression and other Statistics Methods; Delta Rule; Multi-layer Perceptron: Back Propogation Algorithm, Generalized Delta Rule; Nonlinear Regression and Multi-layer Perceptron.

İST514 Advanced Statistical Techniques for Researchers 3+0 7.5

Location and Dispersion measurements for Different Measures; Comparison of Sample Distribution With Theoretical Distribution; Contingency Table; Design; Investigation; Levels of Relations Between Variables; Relations Between Differently Measured Data Sets; Linear Regression and Correlation Coefficient; Estimation of the Population Parameters; Significance of Correlation Coefficients; Basics of Experimental Design.

İST517 Multiple Relation Techniques for Questionnaires Analysis 3+0 7.5

Dependent and Independent Variables and their Importance to be Identified İn Surveys; Linear Relationships Between Variables; Qualitative and Quantitative Properties; Confidence Intervals for the Relationships; Examination and Interpretation; Inference; Some Special Properties of the Variables; Multi collinerity; Interpretation of the Results; Examination of the Applied and Interpreted Surveys; Critique and Review; Some Applications.

İST520 Maximum Entropy Method and Its Applications 3+0 7.5

Maximum entropy (MaxEnt) method, MaxEnt method for discrete random variables, MaxEnt method for continuous random variables. Entropy: Joint entropy and conditional entropy. Information: Relative entropy and information. The maximum entropy distribution, Application of MaxEnt Method, Application to statistics, Application to economics, Application to regional and urban planning.

İST521 Continuous Markov Processes 3+0 7.5

Stochastic Processes; Markov Processes; Poisson Processes; Markov Property; Properties of the Transition Probabities; Ratio Matrix and Kolmogorov's Differential Equations; Limit Distribution; Birth and Death Processes; Pure Birth Processes; Branching Processes; Generating Processes in Branching Processes; Probability of Lost Call and Lost Call Time.

İST522 Stochastic Processes 3+0 7.5

Multi-Dimensional Stochastic Variables; Expected Values of Random Variables; Moment Generating Functions; Characteristic Functions; Limit Theorems about Probability Theory; Conditional Probabilities; Probability Generating Functions; Random Sums; Laplace Transforms of Probability Distributions; Stochastis Processes; Markov Chains for Discrete and Continuous Parameter Spaces: Transition probabilities, Probability matrices; Exponential Distribution and Poisson Process, Birth and Death Process; Queuing Theory and Models.

İST523 Nonparametric Models With Spline Regression 3+0 7.5

Introduction to Nonparametric Regression; Roughness Penalty Approach in Regression; Spline Functions, Signifying Spline Functions as the Sum of Basis Functions; Introduction to R, Solution of Linear and Generalized Linear Models in R; Applications of Nonparametric and Semiparametric Models with Spline Regression in R.

İST524 Generalized Additive Models With Spline Regression 3+0 7.5

Additive Models, Estimating Equations; Generalized Linear Models (GLMs); Generalized Additive Models (GAMs); Algorithms of GAM Solutions; Selection of Smoothing Parameters, Degrees of Freedom; Specification of Knots and Basis Functions; Additive and Generalized Additive Model Applications in R; Applications of Suitable Model Selection for A Specific Model.

İST528 Probabilistic Mixture Theory 3+0 7.5

Lebesgue Measure; Lebesgue Integral; Stieltjes Measure; Lebesgue- Stieltjes Integral; Characteristic Functions of Random Variables; Definition of Mixture Distribution; Identifiability of Mixture Distribution Theorem; Poisson and Binomial Mixture Distribution; Normal Mixture Distribution; Exponential Mixture Distribution; Maximum Entropy Mixture Distribution; Parameter Estimation Methods for Mixture Distribution; Some Sofware for Mixture Distribution.

İST530 Theory of Statistics 3+0 7.5

Probability theory. Probability distribution; Discrete and continuous distributions, multivariate distributions. Some inequalities; Markov, Chebyshev, Hölder, Minkovski, and Jensen. Principle of data reduction; the sufficient principle, likelihood principle. Point Estimation. Methods of finding an estimator; Method of moment, maximum likelihood asymptotic properties of maximum likelihood, fisher information matrix, Bayes estimators, invariant estimator. Methods of evaluating estimators; Mean square error, best unbiased estimators. Hypothesis testing; methods of finding test, likelihood ratio test, Walt test, Lagrange multipliers test, invariant test, bayesian test, asymptotic distribution of LRTs. Methods of evaluating test; Power function, unbiased and invariant test. Interval estimation; Methods of finding interval estimator.

İST531 Linear Models 3+0 7.5

Concepts of Matrix Algebra; Orthogonality, eigenvalues and rank, idempotent matrices, derivatives of matrices and vectors. Quadratic Forms and their Distributions; Expectation and variance of quadratic forms, distributions of some special quadratic forms, independence of quadratic forms. Estimation in Full-Rank Model; Least squares estimators and maximum likelihood estimators, interval estimation, generalized least squares. Hypothesis Testing in Full-Rank Model; Model adequacy, partial and sequential tests, general hypothesis, likelihood ratio criteria. Estimation in Less-than-Full-Rank Model; Conditional inverse, a less than full rank model, estimability, estimating variance in less-than-full-rank model, interval estimation. Hypothesis Testing in Less-than-Full-Rank Model; Hypothesis testing in a general setting, one-way classification model, hypothesis testing on a treatment contrast, two factor design (fixed effect) with interaction and without interaction. Analysis of Covariance. I

İST532 Fuzzy Statistical Methods 3+0 7.5

Aristotle Logic, Fuzzy Logic and Uncertainty; Possibility and Probability Theory; Basics of Fuzzy Set Theory: Fuzzy sets, Crisp sets, Fuzzy logic membership functions: Description of membership function; Fundamental Definitions in Fuzzy Set Theory: Support sets, Normality, ?-cuts, Fuzzy numbers, Convex sets; Fuzzy Sets Operations: Fuzzy union operators, Fuzzy intersection operators, ?-cuts set operations with fuzzy numbers; Fuzzy Inference Systems: Adaptive neuro fuzzy inference systems (ANFIS); Fuzzy Statistical Methods and Interdisciplinary Applications.

İST533 Fundamentals Statistics 3+0 7.5

Definition of statistics and its functions: Obtatining data sets, Presentation, Examining the distributions; Sampling: Sampling errors, Inference; Hypothesis tests; Hypothesis tests for two populations; Comparison of the ratios; Hypothesis tests for large and small sample sizes; Chi-square distribution and Chi-square test for relations between the qualitative variables, Definition of Correlation; Simple linear correlation coefficient and its function, Regression coefficient and its function, Determination coefficient, T and F tests.

İST536 Statistical Softwares 3+0 7.5

Software for Data Analysis; Introduction; Statistical software; Introduction to Minitab; Running Minitab; Minitab Menus; Data input; Data Copy; Data Import and Export; Ordering of Data; Calculator; Data Simulation; Matrix; Calculation of Descriptive Statistics; Graphs; Time Series Graphics; Probability Plots; Commands in Minitab; Saving to Output File; Introduction to SPSS; SPSS Menus; Data Input; Data Copy; Determination of Variables; Add New Variable; Remove Variable; Calculate; Cross Tabulation.

İST537 Actuarial Models 3+0 7.5

Calculation of Premiums: Individual and pooled risk models; Measuring Risk: Coherent risk measures; Dependence Between Risks: Sklars representation theorem; Premiums for Deductibles and Maximum Limits; Calculation of Bühlmann Premiums; Extreme Value Analysis; Generalized Additive Loss Models; Testing Fit of Loss Models by Kolmogorov-Smirnov Test; Measuring Risk with MCMC Methods; Analyzing Loss Tables; SAS Applications.

İST539 Statistical Simulation 3+0 7.5

Concepts of System, Model and Simulation; Random Number Generators: Linear congruential generators; Examination of Some Properties of the Generated Numbers: Run and Gap tests; Generation of Random Numbers from Probability Distribution: Inverse transformation, acceptance-rejection and decomposition methods; Simulation of Some Discrete and Continuous Distributions and Matlab Applications: Binom, Poisson, Gamma; Univariate and Multivariate Normal Distribution; Simulation for Statistical Inference and Matlab Applications: Parameter estimation, Hypothesis test and some applications; Bootstrap and Jacknife Methods and Matlab Applications; Monte Carlo Integration.

İST540 Robust Statistical Methods and Applications 3+0 7.5

Robustlığın Matematiksel Araçları: İstatistiksel fonksiyonel; Fisher Tutarlılık; Differansiyellenebilir İstatistiksel Fonksiyoneller; Robustlığı Ölçme: Etki fonksiyonu; Kırılma Noktası; Robustlık ve Etkinlik Dengesi; Bir Parametrenin Robust Tahmini: M-tahmin edicileri; L-Tahmin Edicileri; Doğrusal Modellerde Robust Tahmin Ediciler: M-tahmin edicileri; GM-Tahmin Edicileri; MM- Tahmin Edicileri; En Küçük Medyan Kareler (LTS) Tahmin Edicileri; Robust Yöntemlerin Bazı Büyük Örneklem Özellikleri; MATLAB ve R Programları ile Uygulamalar.

İST541 Time Series Analysis with Application 3+0 7.5

Fundamental Concepts of Time Series; Time series components/trend, Seasonality, ACF-PACF/autocorrelation tests Bartlett, Box-Pierce Q, Ljung-Box Q, AR-MA-ARMA models and Box-Jenkins methodology; Stationarty and Unit Root Tests; Applications with E-views; Structural Break and Structural Break Tests; Applications with E-views; Co-integration and Co-integration Tests; Applications with E-views; Error Correction Models; Causality in Time Series; Granger Causality; VAR Models, Choice of Degree in a VAR Model; Control of Sufficiency; VAR Impact-Response Function; Vector Error Correction Models.

İST542 Sampling Theory and Methods 3+0 7.5

Basit Rastgele Örneklemede Ana Kütle Ortalaması ve Toplamının Tahmini; Güven Aralıkları ve Örneklem Genişliği; Eşit Olmayan Olasılıklı Örnekleme; Yardımcı Veri ve Oransal Tahmin; Yardımcı Veri ve Regresyon Tahmini; Tabakalı Örnekleme; Küme Örneklemesi ve Sistematik Örnekleme; Çok-aşamalı Düzenler; İki-Evreli Örnekleme; Örnekleme Araştırmasında Uygulamalı Problemler; Yakala-Tekrar Yakala Örneklemesi, Rastgele yanıt modeli.

İST543 Statistics I 3+0 7.5

Statistics II: Statistics Definition, History, General İnformation About the Area; Responsive and Non-Responsive Averages: Arithmetic, Geometric, Harmonic, Quadratic, Mode, Median, Quartiles; Variability: Variance, Standard Deviation, Coefficient of Variation; Variables Discrete Probability Distributions: Binomial, Poisson; Continuous Probability Distributions of Variables: Normal Distribution; Symmetry, Asymmetry, and Kurtosis Taper; Moment: Regression Analysis, Categorical Data Analysis, Chi-Square Test.

İST544 Nonparametric Regression Models 3+0 7.5

Basic Concepts: Nonparametric regression; Density Function: Univariate Case, Multivariate Case, Graphical display, Comparison with histogram; Kernel Density Estimation: Properties and applications; K- Nearest Neighbour Density Estimation; Comparison between Kernel Estimation and K- Nearest Neighbour Density Estimation; Splines: Smoothing splines, Regression splines; Local Polinomial Regression.

İST545 Statistical Analysis with Statistical Packages 3+0 7.5

Introduction to Statistical Packages for Statistical Analysis; An Overview of the Software Menu; Data Entry and Variable Definitions; Survey Data, Frequency Tables and Cross-table Entries; Arranging, Processing and Storing Data; Calculation of Descriptive Statistics and Graphic Illustrations; Parametric Tests: Z and Student's t tests, One-way analysis of variance, Two-way analysis of variance; Nonparametric Tests: Chi-square tests, One sample tests, Independent two sample tests, Paired samples tests; Regression and Correlation Analysis..

İST551 Applied Multivariate Statistical Analysis 3+0 7.5

Basic Concepts; Situations for Simple Linear Regression and Multivariate Regression; Analysis of Multivariate Regression Models; Computer Applications of Multivariate Regression Models; Factor Analysis; Principal Component Analysis: Dimensionality reduction; Logistic Regression; Binary Models(logit, probit,tobit); Canonical Correlation Analysis; Discriminant Analysis; Clustering Analysis: Hierarchical methods, Nonhierarchical methods; General Evaluation of Multivariate Statistical Methods and Applications with Software.

İST552 R For Data Science 3+0 7.5

What is Data Science? Data visualization with ggplot package, Aesthetic Mappings, Facets, Geometric Objects, Statistical Transformations, Position Adjustments, Five dplyr functions: filter, arrange, select, mutate, summarise; Explanatory Data Analysis: Variation, Missing Values, Covariation, Patterns and Models; tidyverse Package: Creating tibble, Data Import, parse function, pivot function, separate function, unite Function, Relational Data, Strings, Factors, lubridate package: date and time data; magrittr paketi; modelr package; Reporting with R: RMarkdown Basics, RMarkdown formats.

İST553 Time Series Analysis with Application 3+0 7.5

Fundamental concepts of Time Series; Time series components: Trend, seasonality; ACF-PACF and Autocorrelation Tests: Bartlett test, Box-Pierce Q test, Ljung-Box Q test; AR-MA-ARMA Models and Box-Jenkins Methodology; Stationarty and Unit Root Tests; Applications with E-views; Structural Break and Structural Break Tests; Applications with E-views; Co-integration and Co-integration Tests; Applications with E-views; Error Correction Models; Causality in Time Series: Granger causality; VAR Models: The Choice of the Degree of a VAR Model, The control of the sufficiency; VAR Impact-Response Function; Vector Error Correction Models.

İST554 Intelligent Optimization Techniques 3+0 7.5

Introduction to Optimization: Definition of the problem, Algebraic and geometric representation; Optimization: Computational applications, Meta-heuristic applications, Single and multivariate optimization, Simplex algorithm; Stochastic Algorithms: Stochastic hill climbing, Tabu search; Evolutionary Algorithms; Genetic Algorithms; Swarm Algorithms; Immune Algorithms; Simulated Annealing; Memetic Algorithms; Artificial Neural Networks: Neuron model, Architectures, Learning process, Layered network models.

İST555 Machine Learning with R 3+0 7.5

Overview In Machine Learning Basics: Evaluation of basic algorithms, Train and test data sets, Overtraining, Accuracy and confusion matrix and other metrics, ROC; Conditional Probabilities: Conditional expectations and loss function, Discriminative approaches (QDA, LDA), Naive Bayes algorithms, Simple linear regression, Smoothing and matrix algebra: Distance, Cross-validation; K-Nearest Neighbour; Support Vector Machine; Classification; Classification with Two Classes; Random Forest; Principal Component Analysis; K-means Algorithm.

İST557 Explainable Artificial Intelligence 3+0 7.5

Introduction to Explainable Artificial Intelligence: Interpretability-performance balance, Model-based and model-agnostic explainers; Instance-Based Explanations: Break-down method, Shapley values, LIME method, Ceteris paribus profiles; Model-Based Explanations: Variable importance measure, Partial dependence profiles, Accumulated local effects; Explanatory Models Analysis: Traning and test set analysis, Comparison of models.

İST559 Data Science with Julia 3+0 7.5

Essential Math for Data Science: Calculus, Linear algebra; Probability and Statistics for Data Science: Basic probability, Discrete and Continuous random variables, Expected value and variance, Distribution families, Statistical inference; Programming Languages: R, Python, Julia; Introduction to Julia: Print, Assign variables, Comment, Syntax; Fundamentals of programming: Conditional expressions, Function definition, Vectorization and functions; Working with Data: Data frames, Split-apply-combine strategies, Visualizing data; Machine Learning: Supervised learning, Unsupervised learning; R Interoperability for Julia: AccessİNg R datasets, InteractİNg wİth R.

İST592 Seminar 3+0 7.5

İST604 Econometric Models 3+0 7.5

Traditional Econometric Methodology; The Traditional View of Econometric Modeling; Under fitting a Model; Over fitting a Model; Tests of Specification Errors. Alternative Econometric Methodologies; Learner's Approach to Model Selection; Hendry's Approach to Model Selection. Selected Diagnostic Tests; The Discrimination Approach; The Discerning Approach. Logit; Probit and Tobit Models.

İST608 Mathematical Methods of Statistics 3+0 7.5

Line Integrals; Functions of Complex Variables; Derivative and Integral; Power Series; Characteristic Functions of Distributions; Inverse Transformations for Characteristic Functions; Uniqueness Theorem for Characteristic Functions; Continuity Theorem for Characteristic Function in R1 and Rn; Some Convergence Theorems; The Normal Distribution in Rn and Some Distributions Connected with Them; Tests of Goodness of Fit; Pearson Theorem.

İST610 Conjoint Analysis 3+0 7.5

Some Concept Related to Conjoint Analysis: Factor (Attribute), Interattribute correlation, Level, Orthogonality, Trade-off method; Comparing Conjoint Analysis with Other Multivariate Methods; Stages of Conjoint Analysis: Research question and objectives, Designing a conjoint analysis experiment, Assumptions of conjoint analysis, Estimating the conjoint model and assessing overall fit, Interpreting the results, Validation of the conjoint results; Conjoint Analysis with a Large Number of Factor.

İST611 Pearson System I 3+0 7.5

Statistics and Decision Making Theory; Explaining the Decision Problem; Solution Stages in the Decision Problem; Univariate Frequency Distributions; Frequency Distributions; Moments; Density Functions; Pearson System in Frequency Distributions; Obtaining the Common Equation of the Pearson System; Obtaining the Basic Types of the System By the Common Equation; Type I (First Main Type); Type IV (Second Main Type); Type VI (Third Main Type); Proofs of the Main Types; Applications.

İST612 Pearson System II 3+0 7.5

Obtaining the Transition Types in Pearson System; Transition Types Which is Produced From the First Main Type Type II; Type VIII; Type IX; Type XII; Transition Function Related to the Second Main Type; Type VII; Transition Function Related to the Third Main Type; Type XI; Special Case of the Type II (Normal Curve); Transition Types Between Main Functions; Type III; Special Case of the Type III; Type X; Type V; Moments of the Overall Types and Obtaining Pearson Criteria; Applications About Transition Types.

İST613 Artificial Neural Networks and Statistical Models I 3+0 7.5

Single-Layer Neural Networks, Perceptron; Multi-Layer Feed-Forward Neural Networks: Back-Propagation Algorithms and Statistical Pattern Recognition; Recurrent Neural Networks and Training Algorithms for Pattern Association: Heteroassociative Memory Neural Network; Autoassociative Net; Elman and Hopfield's Net, Bidirectional Associative Memory (BAM).

İST614 Artificial Neural Networks and Statistical Models II 3+0 7.5

Radial-Basis Function Networks: Exact Interpolation, Regularization Theory, Relation to Kernel Regression, Comparison with MLP; NN Based on Competetion, Fixed-Weight Competitive Nets; Kohonen Self-Organizing Maps; Learning Vector Quantization; Counterpropagation; Adaptive Resonans Theory: ART I, ART II.

İST615 Mathematics Foundation in Regression Analysis I 3+0 7.5

Elements of Matrix Analysis: Generalized Inverse matrices; Idempotent Matrices; Vector, Matrix Norms. General Linear Systems: Gauss Transformation; LU Factorization, Pivoting, Permutations Matrices. Spetial Linear Systems: LDMT and LDLT Factorization; Banded, Block Systems. Orthogonalization: Hoseholder and Givens Matrices; QR Factorization; The Full Rank and the Rank Deficient LS Problems. The Symmetric and Unsymmetric Eigenvalue Problems: Properties and Decompositions; The Jacobi Methods; Computing the SVD; The Hessenberg and Real Schur Forms; The Practical QR Algorithm.

İST616 Mathematics Foundation in Regression Analysis II 3+0 7.5

Matrix Computations in Linear Regression: Kronecker Products and the Vec and Vech Operators; Generalized QR factorization; Applications for Ordinary and Generalized Least Squares and SUR models. Mathematics Foundation in Nonparametric Regression: A Rougness Penalty Approach; Smoothing and Regression Splines, Kernel Regression and Corresponding Mathematics Concept and Operations; Choosing the Smoothing Parameter. Additive and Generalized Additive Regression's Models (GAM): Estimating Equations for Additive Models and its Numerical Solutions.; Fisher Scoring for GAM; Local-Scoring Procedure; A Rougness Penalty Approach; Choosing the Smoothing Parameters.

İST617 Modern Regression Techniques 3+0 7.5

Linear Regression Analysis; History; Estimation of Coefficients; Model and Model Checking; Least Squares Minimization; Least Absolute Deviations (L_1) Regre Sion; Introduction; Algorithms for Line Fitting; Problems in Algorithms; Estimation of Coefficients; M-Regression: a Regression Sample; Lagorithm for Minimization; Line Fitting; Tests for Coefficients; Nonparametric Regression; Line Fitting; Tests for Coefficients; Bayesian Regression; Bayes Approach; Line Fitting; Tests for Coefficients; Ridge Regression; Line Fitting; Standardization; Multi Colliniarity; Comparison of Techniques; Comparison Properties; Samples.

İST618 Information Theory and Statistics 3+0 7.5

The Method of Types; The Law of Large Numbers; Universal Source Coding; Large Deviation Theory; Examples of Sanov's Theorem; The Conditional Limit Theorem; Hypothesis Testing; Stein's Lemma; Chernoff Bound; Lempel-Ziv Coding; Fisher Information and the Cramer-Rao Inequality.

İST621 Advanced Circular Data Analysis 3+0 7.5

Nonparametric Testing Procedures: Single Sample Tests, Two Sample Tests; Distributions on Spheres: Spherical Data, Descriptive Measures, Distributions for Spherical Data; Some Inferences for Spherical Data; Circular Correlation and Regression: Measures of Correlation, Regression Models, Bivariate Distributions, Circular Time Series; Modern Methodology in Circular Data Analysis: Outliers, Robust Methods, Bootstrap Methods; General Sample Spaces; Shape Analysis.

İST622 Fuzzy Neural Integrated Systems 3+0 7.5

Basic Operations in Fuzzy Sets; Expansion of Fuzzy Set Concept; Fuzzy Relation; Fuzzy Arithmetic; Fundamentals of Fuzzy Logic; Fundamentals of Fuzzy Logic Control Systems; Projection Methodology; Integrated Fuzzy Systems and Artificial Neural Networks: Basic Concepts; Reasons for Integrating; The Equivalence of Fuzzy Inference Systems and Artificial Neural Networks; Neural-Network-Based Fuzzy Systems: Neural Realization of Basic Fuzzy Logic Operations; Neural-Network-Based Fuzzy Logic Inference; Neural-Network-Based Fuzzy Modeling; Neural Fuzzy Controllers: Types of Neural Fuzzy Controllers; Structure Learning for Neural Fuzzy Controllers.

İST623 Fuzzy Artificial Neural Networks 3+0 7.5

Types of Fuzzy Neurons; Fuzzification of Neural Network Models: Fuzzy Perception; Fuzzy Classification with the Back Propagation Network; Fuzzy Associative Memories; Fuzzy Kohonen Networks; Neural Networks with Fuzzy Training: Neural Networks with Fuzzy Teaching Input; Neural Networks with Fuzzy Parameters; Fuzzy Control for Learning Parameter Adaptation; Fuzzy Neural Classification; Fuzzy Neural Clustering.

İST625 Entropy Optimization Methods With Applications 3+0 7.5

Entropy and Information for Discrete Systems; Conditional Entropy and Mutual Information; Entropy and Information for Continuous Systems; The Method of Variations in Problems with Fixed Boundaries; Variation and its Properties; Euler Equations; Variational Problems Involving a Conditional Extremum; Contraction Mappings; Newton?s Method for Lagrange Multipliers; Jaynes? Maximum Entropy Principle with Statistical Applications; Kullback?s Minimum Cross-Entropy Principle with Applications.

İST626 Numerical Methods in Modeling with Entropy Optimization Distributions 3+0 7.5

Introduction To Numerical Methods; Linear Equations and Solution Methods for Linear Equations; Nonlinear Equations; Solution Methods for Nonlinear Equations; Numerical Integration Methods; Maximum Entropy Methods for Discrete and Continuous Random Variables; Estimation of Parameters of Statistical Distribution Based on Maximum Entropy Methods; Minimum Cross Entropy Methods for Discrete and Continuous Random Variables; Estimation of Parameters of Statistical Distribution Based on Minimum Cross Entropy Methods.

İST627 Fundamentals of Stochastic Differential Equations 3+0 7.5

A Hilbert Space of Random Variables; Convergence of Sequences of Random Variables, Exercises; Discrete stochastic processes; Continous Stochastic Processes; A Hilbert space of stochastic processes, Exercises; Stochastic Integrals of the form , Definition of Brownian motion and its properties, Winner integral, Conditional expectation, Martingales, Ito stochastic integrals, Approximation of stochastic integrals, Stochastic differential and Ito's formula, Ito's formula for martingales, Applications of Ito formula, Stratonovich stochastic integrals; Multidimensional Ito's formula, Exercises.

İST628 Stochastic Differential Equations and Applications 3+0 7.5

Properties of Solutions to SDE, Some Examples, Bellman-Gronwall Inequality, Existence and Uniqueness Theorem, Ito?s Formula and Exact Solutions; Approximating SDE, Systems of SDE; Markov Property, Solutions of SDE, Diffusion Processes, Kolmogorov (Foker-Plauk) Equations, Stability; Parameter Estimation for SDE, Linear SDE, Feynman-Kac Formula, SDE Models in Physical Systems, in Finance and in Biology.

İST629 Stochastic Modeling and Analysis 3+0 7.5

Stochastic Processes: Probability, Distribution And Distribution Function; Expectation, Variance and Covariance; Independence and Dependence; Expectation And Covariance Function for Stochastic Processes; Dependence for Stochastic Processes: Stationary Increments, Independent Increments; Brownian Motion: Defining Properties; Processes Derived from Brownian Motion; Simulation of Brownian Sample Paths; Systems with Stochastic Inputs and the Power Spectrum; Continuity for Stochastic Processes; Differentiation for Stochastic Processes; Integration for Stochastic Processes; Applications.

İST631 Robust Statistical Methods 3+0 7.5

Comparison of Classical and Robust Approaches; Robust Estimates of Location and Scale; Measuring Robustness: Influence function, Breakdown point; Balancing Robustness and Efficiency; Some Robust Estimation Methods: Trimmed least squares, M-estimation, Least absolute deviations (LAD), Least median squares (LTS), Weighted least squares; Partially Adaptive Estimation; Robust Estimation for Regression Model and Parameters of Distributions; Applications in Matlab Program.

İST632 Statistics II 3+0 7.5

Statistics II: Statistical Decision Theory: Hypothesis Testing, Parametric and Non-Parametric Approaches, With Large Sample Hypothesis Testing, Hypothesis Testing With Small Samples; Strength Testing; Chi-Square Distribution: Chi-Square Tests; Simple Linear Regression and Correlation Techniques, T-Test; Analysis of Variance; Analysis of Covariance; Random Block Design; Factorial Experiments; Multivariate Statistical Tests; Factor Analysis; Multivariate Analysis of Variance; Multivariate Analysis of Covariance.

İST633 Data Visualization 3+0 7.5

Some Milestones in the History of Statistical Graphics; Introduction to Visual Literacy: Graphic elements and color theory; Tufte's Principles of Scientific Graphics; Visualization of Temporal Data; Visualization of Spatial Data; Multivariate Data Analysis; Cluster Analysis: Hierarchical and non-hierarchical; Dimension Reduction Methods: Principle component analysis, Correspondence analysis and related methods; Visualization of Textual Data; Networks, Hierarchies and Trees; Big Data Visualization Challenges; Dynamic and Interactive Graphics.

İST635 Advanced Theory of Statistics 3+0 7.5

Location-scale families, Exponential families, Sufficient statistics, Factorization criterion, Minimally sufficient statistics, Completeness, Convex loss functions, Uniformly minimum variance unbiased (UMVU) estimator, Locally minimum variance unbiased estimator (LMVU), Deriving UMVU estimators, Nonparametric families, Information inequality, Invariance and equivariance, Minimum risk equivariant (MRE) estimator, Principle of equivariance, Bayes estimator, Uniformly most powerful tests (UMP), Neyman Pearson Lemma, p-value, Monotone likelihood ratio, Likelihood ratio test, Unbiasedness for hypothesis testing, UMP tests for multiparameter exponential families

İST636 Econometric Modelling 3+0 7.5

Introduction to Econometrics; Linear Regression Models; Nonlinear Regression Models; Spatial Regression Models; Model Selection Criteria; Truncated and Censored Data; Regression Models for Count Data; Truncated Regression; Censored Regression; Censoring and Truncation in Models; Bias Correction Methods; Simulation and Real Life Applications in Matlab Program.

İST637 Stochastic Differantial Equations I 3+0 7.5

Hilbert Space of Random Variables; Hilbert Space of Stochastic Processes; Stochastic Integrals of the Form ?_a^t?f(s,w)ds; Ito ? Stochastic Integrals, Approximation of Stochastic Integrals; Stochastic Differantials and Ito ?'s Formula; Stratonovich Stochastic Integrals; Existence of the Unique Solution of SDE; Properties of Solutions to Stochastic Differantial Equations; Ito ?'s Formula and Exact Solutions; Approximating Stochastic Differantial Equations; Kolmogorov (Fokker-Plank) Equation; Maximum Likelihood Estimation Method; A Non-parametric Estimation Method.

İST638 Stochastic Differantial Equations II 3+0 7.5

Introduction to Modelling by Stochastic Differantial Equations; Population Examples in Biology; General Model of Two Interacting Populations; Epidemic Model; Predator-Prey Model; Persistence-Time Estimation; A Population Model with Time Delay; A Model Including Environmental Variability; Stochastic Finance Models; A Stock-Price Model; Option Pricing; Interest Rates; A Goodness of Fit Test for SDE Model; Alternate Equivalent SDE Models.

İST639 Fuzzy Statistics and Probability 3+0 7.5

Introduction: Crisp sets and Fuzzy sets, Fuzzy sets operations, Fuzzy numbers: Type-1 fuzzy numbers, Type-2 fuzzy numbers, Intuitionistic fuzzy numbers, Hesitant fuzzy numbers, Fuzzy central tendency measures: Fuzzy arithmetic mean, Fuzzy mode, Fuzzy median, Fuzzy dispersion measures: Fuzzy standard deviation and fuzzy variance, Fuzzy random variables, Fuzzy probability, Fuzzy discrete distributions: Fuzzy binomial distribution, Fuzzy poisson distribution, Fuzzy continuous distribution: Fuzzy normal distribution, Fuzzy uniform distribution, Fuzzy exponential distribution, Fuzzy confidence interval: Mean and variance, Intuitionistic fuzzy confidence interval.

İST640 Advanced Experimental Design 3+0 7.5

Factorial Models with Mixed Levels; Factors at Two and Three Levels; Factors at Two and Four Levels, Nested and Split-Plot Designs; The Two-Stage Nested Design; The M-Stage Nested Design; The Split-Plot Design; The Split-Split-Plot Design; Response Surface Methods; Location of the Stationary Point; Response Surface Characterization; Ridge Systems; Multiple Responses; Experimental Designs for Fitting Response Surface; Mixture Experiments; Evolutionary Operation; Taguchi's Distributions in Experimental Design.

İST641 Advanced Nonparametric Regresyon Models 3+0 7.5

Basic Concepts: Linear regression model, Additive regression models, Generalized additive models; Solution Algorithms of the Generalized Additive Models; Selection of the Smoothing Parameters; Degrees of Freedom; Basis Functions; Determining the Number of Knots and the Basis Functions; Hypothesis Testing; Model Selection; Applications of the Generalized Additive Regression Models.

İST642 Modeling with Stochastic Differential Equations 3+0 7.5

Introduction to Modelling by Stochastic Differential Equations (SDE); Population Biology Examples; General Model of Two Interacting Populations; Epidemic Model; Predator- Prey Model; Persistence-Time Estimation; A Population Model with a Time Delay; A Model Including Environmental Variability; Some Stochastic Finance Models; A Stock-Price Model; Option Pricing; Interest Rates; A Goodness of Fit Tests for an SDE Model; Alternate Equivalent SDE Models.

İST647 Reliability Theory 3+0 7.5

Basic Concepts of Reliability Theory; Failure Rate Function; Failure Constant Failure Rate Model: Exponential distribution; Time-Dependent Failure Models: Weibull distribution, Normal distribution and extreme value distribution; Reliability of Systems: Series systems, Parallel systems, Series-parallel systems; Stress-Strength Reliability; Estimation of Stress-Strength Reliability; Censored Samples; Reliability Estimation under Censored Sample; Counting Processes: Renewal process and poisson process; Applications of Counting Processes.

İST649 Stochastic Differential Equations 3+0 7.5

A Hilbert Space of Random Variables; A Hilbert Space of Stochastic Processes; Integrals of the Form $\int_a^t f(s,w)ds$; Itô Stochastic Integrals; Approximation of Stochastic Integrals; Stochastic Differantials and Itô's Formula; Stratonovich Stochastic Integrals; Existence of Unique Solution of Stochastic Differential Equations; Properties of Solutions to Stochastic Differential Equations; Itô's Formula and Exact Solutions; Approximating Stochastic Differantial Equations; Forward Kolmogorov (Fokker-Plank) Equation; A Maximum Likelihood Estimation Method; A nonparametric Estimation Method.

İST692 Seminar 3+0 7.5

İST790 Thesis 0+1 30.0

İST890 Thesis 0+1 30.0

İST890-0 Thesis (Thesis Proposal) 0+1 30.0

İŞL508 Human Resources Strategies and Applications 3+0 7.5

Establishing human resources department applications, human resources planning strategies, recruitment strategies, selection strategies, orientation strategies, training strategies, performance appraisal strategies, career planning strategies, job safety and health strategies, discipline strategies, employer-employee relations strategies, compensation management strategies and applications.

İŞL578 Sport and Facility Business 3+0 7.5

The structure of the sports industry; Basic concepts of business; Entrepreneurship in sports business ; Sports business and investment activities ; Business management functions and management in sports business; Marketing functions and strategies in sports business; Production services and its functions in sports business; Financing functions of sports business; Human resource management in sports business; Public relations in sports business Use of technology in sports business.

İTB501 Biotechnology 3+0 7.5

History of Biotechnology; Recombinant DNA Technology, Manipulation of Prokaryotic Gene Expression, Production of Protein in Eukaryotic Cells, Development and Use of Genetically Modified Plants and Animals, High Protein Production in Recombinant Microorganisms; Fermentation Technology and Regulation, Isolation and Protection of Metabolism in Microorganisms, Preferable Commercial Features of Microorganisms, Coulter Collection; Enzyme Technology; DNA Sensors, Molecular Diagnosis, Gene Thearapy in Human Somatic Cells, Genetic Practices in Food Technologies; Gene Engineering, Genetic Transformation Systems, Bioinsectisids; Social Dimention of Biotechnology; Patents and Brands.

İTB503 Biotechnology Laboratory Techniques I 3+0 7.5

Biosafety; Basic Principles of Spectroscopy, UV and Visible Molecular Absorption Spectroscopy, Basic Procedures of Mass Spectroscopy, IR Spectroscopy, Nucleer Magnetic Rezonans Spectroscopy (NMR), Cromatographic Analysis Techniques and Seperation Procedures, GC, GC-MS, Thermal Analysis Techniques (TG, DTA, DSC), Preparation of Natural Compounds for Structural Analysis, Scanning Electron Microscopy and Microanalysis.

İTB504 Biotechnology Laboratory Techniques II 3+0 7.5

Bacterial Evaluation Techniques, Biomonitoring, Cell Culture Techniques, Purification of Proteins and Analysis Methods, ELISA, DNA and RNA Isolation and Analysis Methods, Prenciples of PCR, DNA Fingerprints, In Vitro Transcripsion, In Vitro Mutasion, Recombinant DNA Techniques.

İTB505 Biomaterials 3+0 7.5

Introduction, Use of Alumina and Zirkonia in Inplants, Introduction to Bio-active Glasses; Production, Composition, Properties, Reaction Kinetics and Clinical Applications, A/W Glass-Ceramics; Prosesses, Properties and Clinical Applications, Ceravital Bio-Active Glass-Ceramics, Machinable Phosphate Based Glass-Ceramics, Dense Hydroxiapathite, Porous Hydroxiapathite, Surface Coatings, Bioceramic Composites, Biometals, Characterisation of Biomaterials

İTB506 Drug Design and Application 3+0 7.5

Planning Drug Development, Chemical Development, Formulation Development, Characteristics of Drug Development: Electronic Properties, Ionization Costants, Hydrophobic Interactions, Steric Parameters, Hydrophobic Interctions and Lipophilicity, Partition Constants as Lipophilicity Index, Effects of Ionization on Partition Constant, Suggestion of Lipophilicity, Suggestion ofIonization, Suggestion of Steric Parameters. Prediction of Drug Receptor Relationship, Prediction of Mutagenesis, Ligand Bonding Studies, Biological Evaluation: Ligand Bonding, Secondary Messenger Measurements, Measurement of Functional Activity, Quantification of Agonist Activity, Quantification of AntagonistActivity, in Vivo Tests, SAR and QSAR Linear Regression and Multiple Linear Regression.

İTB507 Biometer 3+0 7.5

Data Understanding in Biological Research. Calculation of Descriptive Statistics, Introduction to Probability Disribution; Binom and Poisson Disribution, Normal Disribution and Its Application. Sampling Tecniques, Estimation, Tests for Statistical Hypotheses, ANOVA, Regression Analysis, Spatial Analysis, Allometry

İTB508 Applications of High Performance Liquid Chromatography in Biotechnology 3+0 7.5

Important Parameters for Application of HPLC in Biotechnology; Sample Collection and Preparation; Characteristics of Sample and Standards; Selection of Column, Dedector, Mobile Phase and Other Important Subjects; Position of HPLC in Purification of Enzymes; Importance of HPLC in Waste Water; Analysis of Protein and Peptide in HPLC and Applications; Applications of HPLC for Terpenoids.

İTB509 Biotechnological Production of Medicine Raw Materials 3+0 7.5

Presences of Secondary Metabolites and Biotechnological Examples; Biotechnological Utilization of Plant Genetic Resources for the Production of Phytopharmaceuticals; Methods for the Biotechnological Pathway for the Active Natural or Semi-Synthetic Derivatives; Analytical and Preparative Methods by Structural Elucidation and Characterization After Biotechnological Production of Important Commercial Secondary Metabolites; Magnetic Force Microscopy (MFM), Scanning hall aygıtı microscopy, Scanning electron microscopy (SEM), Transmission electron microscopy (TEM)

İTB510 Biosensors and Their Basic Principles 3+0 7.5

General overview of biosensors and basics; Bioreseptors and their immobilization; Preparation of transducer with conductive polymers; Electrochemical biosensors; Enzyme sensors; Some specific applications of enzyme sensors; Performance factors of enzyme sensors; Optic biosensors; Nucleic acid analysis and biosensors; Immunosensors; Affinity biosensors; Use fields of biosensors.

İTB511 DNA Vaccines and Viral Vector 3+0 7.5

Nucleic Acid Vaccines: DNA vaccines, RNA vaccines; Biological, Chemical and Physical Methods of DNA Vaccination; Viral Vectors: Poxviruses, Adenoviruses, Herpesviruses, Adeno-Associated viruses; Viral Vector Systems: Manufacture and stability, Safety, Effect of immunity, Therapeutic payload; Mechanism of DNA Vaccines in Cells; Routes of Immunization; Limitations of Plasmid DNA Immunogens.

İTB513 Antisense Technology and its Applications 3+0 7.5

Antisense Technology and Its Applications: Antisense oligonucleotides, RNA interference, Gene silencing mechanisms; miRNA and Production; Areas of Use of miRNA; siRNA and Production; Areas of Use of siRNA; In Vitro and In Vivo Stability of siRNA; Encapsulation of siRNA with Drug Delivery Systems; RNA Vaccines; Using of Antisense Technology in Cancer Therapy; Assessment of Antisense Technology.

İTB515 Microorganisms in Bioelectrochemical Systems 3+0 7.5

Fuel Cells and Bioelectricity; Microbial Energy Production from Biomass; Enzymatic Fuel Cells; Survey of Direct Electron Transfer from Microbes; Genetically Modified Microorganisms for Bioelectrochemical Systems; Organics Oxidation; Fundamentals of Benthic Microbial Fuel Cells; Microbial Fuel Cells for Biochemical Oxygen Demand; Integrating Bioelectrochemical Systems into Wastewater and Sludge Treatment.

İTB517 Biosafety in Microbiology Laboratory 3+0 7.5

Concept of Biosafety; Importance of Biosafety in Microbiology Laboratories; International Standards and Regulations on Laboratory Safety; Biosafety Levels and Infectious Agents; Laboratory-Acquired Infections; Protection of Workers from Biological Risk Factors; Principles of Laboratory Cleaning, Disinfection and Decontamination: Medical Wastes and Their Destruction; Symbols and Warnings Used in Laboratory Safety; Design of a Safe Microbiology Laboratory.

İTB519 Microbial Bioremediation and Biodegradation 3+0 7.5

Definition and Types of Bioremediation; Bioremediation Strategies: In situ bioremediation, Ex situ bioremediation; Bioremediation in Aquatic and Terrestrial Systems; Groundwater Bioremediation; Bioremediation of Petroleum Hydrocarbons; Definition and Types of Biodegradation; Biodegradation Applications; Microbial Sources; Use of Genetically Modified Microorganisms.

İTB521 Microbial Biotechnology 3+0 7.5

Microbial Diversity; Microbial Growth Kinetics; Bioinformatic Applications in Microbiological Research; Food Products Involving Microorganisms and Their Products; Pharmaceutical Products Obtained Through the Use of Microorganisms; Importance of Omics in Drug Discovery (Genomics, Transcriptomics, Proteomics, Metabolomics); Model Microorganisms used in the Pharmaceutical Industry; Techniques Used in Microbial Biotechnology in the Pharmaceutical Industry; Biotechnology of Microbial Primary Metabolites; Biotechnology of Microbial Secondary Metabolites; Microorganisms and Environmental Biotechnology; Recombinant DNA Technology.

İTB523 Molecular Pharmacological Methods 2+1 7.5

Use of Cell Culture Methods in Evaluation of Drug Effects: Cytotoxicity, Real time cell proliferation analysis, Cell cycles and Apoptotic analysis, Neuronal differentiation, Wound healing; Molecular Cell Mechanisms, Related Genes and Products; DNA, RNA and Protein Isolations from Tissue, Blood and Cell Culture; Western Blood Analysis; Gene Polymorphism and Drug Effects; PCR, RFLP and Gel Electrophoresis Applications; cDNA and RT-PCR; RNAi, Gene Array and Microarray Technology in Pharmacological Studies; Use of ELISA, Immunohistochemistry, Immunofluorescence and Immunoprecipitation Methods in Evaluation of Drug Effects.

İTB525 Introduction to Synthetic Biology and Metabolic Engineering 3+0 7.5

The Basics of Synthetic Biology and Metabolic Engineering; Applications; Tools and Techniques; Understanding Cellular Systems for Biotechnological Applications; Re-Design of Metabolic Pathways in Biological Systems; Creating Cell Factories; Protein Engineering; Synthetic Biology and Metabolic Engineering Applications for Biofuel Production; Production of Secondary Metabolites; Production of Pharmaceuticals; Insulin Sample; Artemisin Sample; Project Design; Future of Synthetic Biology and Metabolic Engineering in Turkey.

İTB526 Advanced Chromatographic Techniques 3+0 7.5

Classification of Chromatographic Techniques; Instrumental Chromatographic Methods; Gas Chromatography (GC) and Hybrid Systems; Supercritical Fluid Chromatography (SFC); High Performance Liquid Chromatography (HPLC) and Hybrid Systems; Method Development in Liquid Chromatography (LC); Micro-Nano LC; Fast Protein Liquid Chromatography (FPLC) and Ultra Fast Liquid Chromatography (UFLC) Systems; Application Fields of HPLC: Chromatographic analysis of biomolecules, Drugs and pesitisitis; Qualitative and Quantitative Analysis Evaluation: Validation.

İTB527 Biological Screening Tests of Natural Products 3+0 7.5

Natural Products and their Sources; Chemistry of Natural Compounds; Antimicrobial Screening Tests: Dilution and Diffusion methods, CLSI and EUCAST; Mechanisms of Action; Natural Anticancer Products; Cancer and cancer therapy; Mechanisms of Action; Anticancer Screening Tests: Preclinical, Cell-based and genotoxicity screening tests; Toxicogenomic Screening Tools; Free Radicals and Antioxidants; Antioxidant Activity Screening Methods.

İTB529 Seperation and PurificationTechniques of Biomolecules 3+0 7.5

An Overview of Biological Seperation and Purification Techniques: Definition, Application areas; Properties of Purification Techniques; Cell Disruption: Physical methods, Chemical methods; Separation and Purification Techniques: Centrifugation techniques, Filtration, Precipitation; Chromatographic Methods: Ion exchange chromatography, Gel filtration chromatography, Hydrophobic interaction chromatography, Adsorption chromatography, Affinity chromatography, High performance liquid chromatography; Purity Analysis: Spectrophotometric analysis, Electrophoretic analysis.

İTB531 Electrochemical Biosensors 3+0 7.5

Definition, structure and classification of biosensors; Advantages and application areas of biosensors; Introduction to electrochemical biosensors; Conductometric biosensors and Potentiometric biosensors; Amperometric biosensors; Performance criteria of electrochemical biosensors; Enzyme-based electrochemical biosensors; Use of nanomaterials in electrochemical biosensors; Use of conductive polymers in electrochemical biosensors; Transducers used in electrochemical biosensors; Preparation of electrochemical biosensors and immobilization of biomaterial; Recent developments in electrochemical biosensors and scientific discussion

İTB533 Gas Chromatography and Applications in Biotechnology 2+1 7.5

Fundamental Principles of Gas Chromatography; Components of Gas Chromatography; Injection Systems; Columns: Types of columns, Column Materials; Detectors: Flame ionization detector, Thermal conductivity detector; Mass spectrometer;

Ionization; Mass Analyzer; Analysis: Selecting and preparation of samples, Method development for temperature programing, Qualitative analysis, Quantitative analysis.

İTB535 Gene Therapy Techniques 3+0 7.5

Introduction: What is gene therapy?, History of gene therapy; Types of Gene Therapy: Germ Cell Gene Therapy, Somatic Cell Gene Therapy; Gene Therapy Vectors: Vector applications, General introduction of viruses; Gene Transfer Methods: Viral gene transfer systems, Adeno viruses (ADV) and Adeno-associated virus (AAV) applications, Retroviral vectors, Lentivirus (HIV) vectors, Herpes Viruses; Non-viral Gene Delivery Systems: Chemical methods, Physical methods; RNAi Based Therapeutic Strategies; Gene Silencing Methods- CRISPR-Cas9; Gene Therapy and Biosafety.

İTB592 Seminar 3+0 7.5

İTB790 Thesis 0+1 30.0

İTE502 Sustainable Energy Management 3+0 7.5

Global Energy Policies and Sustainability; Energy and Environment Approaches in the World: European Union and Turkey, Energy-environment relationship, Development plans, Global warming and climate change; Kyoto Protocol: Carbon footprint, Carbon management and planning, Environmental impact assessment; Environmental Impact Assessment Laws and Regulations; Environmental Impacts of Conventional Energy Sources; Energy Management and Environmental Impacts: Energy saving and efficiency.

İTE503 Energy Economics 3+0 7.5

Basic Concepts of Economics; Energy and Economic Dimensions; Economic Analysis of Energy Projects; Financing of Energy Projects; Alternative Energy Sources; Energy Investment Planning: Tariffing and Pricing; Energy Cost Analysis; Energy Trading; Energy Derivatives Markets; Global Energy Potential: Supply and Demand; Energy Balance; Global Energy Markets; Regional Views for the Next 30 Years: Prevailing Trends and Forecasts; Energy Indicators; Energy Policy Analysis and Modeling; Energy and Economic Growth; Liberalization and Competition Arrangements in Energy Markets; Energy and Sustainable Development.

İTE505 Renewable Energy Sources 3+0 7.5

Solar Energy: Solar angles, Solar radiation intensity, Solar collectors, Solar power plants, Heating-cooling applications; Geothermal Energy: Electricity generation, Potential of geothermal energy; Wind Power: Wind turbines; Hydrogen Energy: Energy system, Electricity generation; Wave-Tidal Energy: Electricity generation; Biomass Energy: Biochemical conversion processes.

İTE516 Petroleum Refinery Engineering 3+0 7.5

History and Development of Refining; Petroleum Refinery; Formation and Content of Crude Oil; Classification of Crude Oil; Distillation of Crude Oil; Acquirement of Light Hydrocarbon; Naphtha Hydrogenation; Evaluation of gasoline; Assessment of Gasoline; Acquirement of Aromatic Hydrocarbons; Thermal Cracking; Acquirement of Gas; Obtaining of Cracking Gasoline; Isomerization of Butane; Alkylation; Extraction of Furfural; Hydrogenation of Lubricating Oil; Lubricating Oil and Obtainment of Wax; Removal of Asphalt with Propane; Coking; Asphalt Processing; Wastewater Treatment.

İTE518 Using of Coal and Coal Technologies 3+0 7.5

Coal Formation Petrography and Classification of Coal; Physical Properties of Coal and Other Technological Properties; Thermal Properties of Coal; Methods of Coal Production and Effect of Coal Quality; Desulphurisation of Coal: Combustion of Coal; Preparation of Coal-Water Mixtures and Combustion of coal-Water Mixtures; Coking of Coal; Pyrolysis of Coal; Low Temperature Carbonisation of Coal; Gasification of Coal; Underground Gasification of Coal; Coal Liquefaction.

İTE519 Solar Energy and its Applications 3+0 7.5

Solar Energy; Geometry and Angles of the Sun; Basic Calculations of Solar Energy: Extraterrestrial solar radiation and its calculation, Solar radiation on the earth surface and its calculation; Solar Radiation Measurements; Photovoltaics: Structure of the photovoltaics and production of electricity; Solar energy collectors: Plane collectors, Vacuum collectors, Systems with condenser; Storage systems of solar energy: Heat energy storage systems, Electrical energy storage systems; Solar energy potential in Turkey; Solar energy applications: Cooling, Water distillation, Drying, Greenhouse heating, Cookers, Steam and electricity production, Indoor air heating.

İTE520 Electrochemical Energy Conversion Systems 3+0 7.5

Basic Principles of Electrochemistry; Effect of Concentration on Electrode Potentials: Nerst equation; Concentration Batteries and Electrolysis; Electrochemical Energy Storage; Batteries and Their Working Principles; Accumulators and Their Working Principles; Fuel Cells and Their Working Principles; Electrodes Used in Fuel Cells and Their Properties; Membranes Used in Fuel Cells and Their Properties; Fuels Used in Fuel Cells and Their Properties; Supercapacitors; Electrochemical Hydrogen Production; Areas of Use of Batteries and Accumulators; Areas of Use of Fuel Cells.

İTE521 Fuels and Combustion Technology 3+0 7.5

Fundamentals of Fuels and Combustion Technology; Classification of Natural Fuels; Secondary Fuels; Pulverized Coal, Smokeless Fuel, Chemistry and Technology of Semi- Coke and Coke Production; Liquid and Gaseous Fuels; Combustion Chemistry and Technology; Environmental Impacts and Mitigation Developments Regarding Negative Effects of Solid and Liquid Fuels; Solid, Liquid and Gaseous Fuels Analysis and Quality Control.

İTE522 Renewable Energy Sources and Smart Grids 3+0 7.5

Renewable Energy Sources and Renewable Energy Supply; Electricity Production Methods, Materials Used; Conventional Energy Provision Systems, Materials Used; Benchmarking of Renewable and Conventional Energy Production; Conventional Electricity Network Lines and Smart Grids; Smart Grid Applications; Smart Grid and Its Use in Turkey; Smart Grids in the World; Future of Electrical Energy Management Systems.

İTE523 Coal Processing Technologies 3+0 7.5

The Place of Coal in Energy Resources of the World and Turkey; Sampling; Coal Classification; Physical and Chemical Properties of Coal; Inorganic Materials in Coals; Introduction to Coal Preparation and Coal Technology: Washability curves of coals, Preparation of coal for utilization; Coal Concentration: Physical, physicochemical, chemical and biological concentration; Coal Technology: Coking of coal, Coal liquefaction, Gasification of coal, Briquetting of coal.

İTE524 Energy Audit for Buildings 3+0 7.5

Energy Efficiency Regulations; Standards for Energy Efficiency; Regulations for Energy Audit; Energy Audit Reports; Energy Policies and Energy Management Systems; Examples of Energy Management in the World; Building Energy Identity Documents; Measurement Tools and Metrics Used in Energy Audits; Energy Efficiency for Electric Motors and Instruments; Energy Saving; Examples of Building Energy Audit; Studies on Energy Audit and Energy Efficiency.

İTE525 Management of Energy Plant Wastes 3+0 7.5

Introduction to Waste Management in Power Plants: Concept of waste, Classification and characterization of wastes; Characterization and Management of Thermal Power Plant Wastes: Management of flue gas and bottom ash wastes; Characterization and Management of Hydraulic Power Plant Wastes; Characterization and Management of Nuclear Power Plant Wastes: Management of production and concentration of nuclear fuel wastes, Determinations of environmental risks in nuclear power plant locations, Determinations of security risks in nuclear power plants; Characterization and Management of Renewable Power Plant Wastes; National and International Legislation about Waste Management.

İTE526 Wind Energy 4+0 7.5

Introduction to Wind Energy, Structure and Variety of Wind Turbines; Aerodynamics of Horizontal-axis Wind Turbines; Relationship between Wind Speed and Power, Effects of Atmospheric Conditions on Wind Turbines, Calculation of Rotor Efficiency, Generator Systems for Wind Turbines; Speed Control for Maximum Power Operation; Wind Farms; Statistical Distributions of Wind Speed; Forecasting Wind Energy and Capacity Factors; Wind?Energy?Economics; Wind Power Grid Integration.

İTE527 Energy Efficient Lighting Technologies 3+0 7.5

Photometric Quantities; Light Production Technologies; Lighting Components: Lighting sources, Luminaires, Lighting accessories; Automation and Control Strategies; Lighting Calculation Methods; Energy Efficiency Regulations about Lighting; Economic Analyses and Calculation of Payback Periods in Lighting Systems; Energy Efficient Lighting Technologies for Industrial Plants, Building and Transport.

İTE528 Nuclear Energy and Politics 3+0 7.5

Energy consumption, depletion of reserves, environmental impacts; Source of nuclear energy; Types of nuclear fuel; Nuclear fission and uranium fission; Nuclear power production; Nuclear waste management: Radiation protection standards, Radiations and radioactive materials, Reliability and qualitative risk evaluation, Safety measures in nuclear power plants; Site selection for nuclear power plants and licensing them; Nuclear energy policies of Turkey: Nuclear energy policies of the European Union; Nuclear energy policies in other countries.

İTE529 Different Energy Sources, Sustainability and Life Cycle Assessment 3+0 7.5

Different Energy Sources: Conventional energy sources, Renewable energy sources; Clean Production and Pollution Prevention: Clean production techniques, Pollution prevention planning; Sustainability: Sustainability concept, Relationship

between clean production and sustainability; Life Cycle Assessment (LCA): Concept and history; LCA Methodology: LCA and ISO 14040 standards, Goal and scope definition, Inventory analysis, Impact assessment, Interpretation; LCA Software and Applications; Carbon Footprint Measurement Using LCA Approach.

İTE530 Energy Storage Devices and Applications 3+0 7.5

Energy storage and importance of energy storage for renewable energy sources; Types of energy and the second law of thermodynamics; Chemical energy storage methods; Lead acid batteries; Lithium ion batteries; Fluid batteries; Hydrogen fuel cells; Mechanical energy storage methods; Flywheel storage; Compressed air energy storage and Pressurized water storage; Electrical energy storage; Ultracapacitors/Supercapacitors; Superconducting magnetic energy storage.

İTE531 Waste-to-Energy Systems Credit 3+0 7.5

Principles of Waste Management; Relationship Between Waste Management and Energy; Thermal Conversion Technologies: Fundamentals of thermal processes, Mass and energy balances of waste combustion, Incineration, Pyrolysis, Gasification, Energy from thermal conversion processes; Biological Conversion Technologies: Aerobic and anaerobic composting processes and technologies, Energy from biological conversion processes; Landfills: Landfill design, Energy from landfill gas; Comparison of Waste-to-Energy Processes.

İTE532 Electromagnetic Energy: From Motors to Laser 3+0 7.5

Components of the mobile phone, Energy and power, Electric and gas engine, Energy in electrical systems, Electromagnetic wave spectrum, Energy conversion systems: Electromagnetic launcher, Diffraction and holography, Liquid crystal display technology (LCD), Semiconductors, Light emitting diodes (LEDs), Photodetectors, solar cells, Light Amplification by Stimulated Emission of Radiation (LASER)

İTE533 Conventional Energy Resources 3+0 7.5

Energy, Classification of Energy and Importance of Energy; Energy Resources in Turkey and in the World and Their Potentials; Formation, Properties and Preparation of Coals: Formation and structure of coals, Properties of coals, Production methods of coals, Areas of usage of coals and coal technologies; Areas of Usage of Coal: Thermal processes for coals in power plants, heating and industry; Petroleum Production: Theories of petroleum formation, Petroleum reservoirs, Physical and chemical properties of petroleum, Petroleum supply in the nature, Petroleum prospecting, Production, transport, storage and refinery processes of petroleum; Petroleum Refining Processes: Raw petroleum distillation column and products.

İTE592 Seminar 3+0 7.5

İTE599 Semester Project 3+0 0.0

İTE790 Thesis 0+1 30.0

İTN501 Atom and Molecular Structure 3+0 7.5

Structure of Atoms, Periodic Properties of Elements, Electronic Structure of Elements, Chemical Bonds, Interactions Between Particles, Geometry of Molecules, Attraction Forces Between Molecules, Description of Molecules, Doped Structures and k.p. Calculations of These Structures, Diffusion Equations, Solutions of Boltzman Equations, Basics of Quantum Physics, Photoelectricity, Matter and Wave, Principles of Uncertainity, Schrödinger Equation, Angular Momentum and Spin, Perturbation Theory, Variation Method, Symmetry and Transformations.

İTN502 Nanotechnology 3+0 7.5

Introduction to Nanotechnology, Nanobiology, Nanochemistry, Nanotechnology and Nanomedicine, Nanomaterials, Synthesis of Nanomaterials, Characterisation of Nanomaterials, Nanodevices, NEMS based Nanotechnology, Nanostorage, Nanorecognition

İTN503 Applications of Nanotechnology 3+0 7.5

Electronics; Nanotubes for Nanoelectronics, Vacuum Nanoelectronics, DNA Electronics, Nanoelectromechanical Systems, Molecular Electronic Devices; Health, Nanotechnology and Nanomedicine, Medical Nanomaterials, Biotechnology Devices, Medical Nanorobotics, Polymeric Nanoparticles for Drug and Gene Delivery, Pharmaceutical Nanotechnology, Biocompatible Core-Shell Nanoparticles, Nanocrystals of Poorly Soluble Drugs, Nanoparticles as Drug Delivery Systems,

Nanomagnetics for Biomedical Applications ; Physics; Chemistry; Nanochemistry, Sol-Gel Chemistry, Techniques in Electrochemical Nanotechnology, Polymer Nanostructures, Nanostructured Bipolar Organic Polymers; Engineering; Electronic, Computer, Construction, Material, Chemistry, Genetic and Gene Engineering

İTN504 (Eng) Mathematical Applications in Nanotechnology 3+0 7.5

Fundamental Concepts: Vector differential operators, Gradient, Divergence and curl of scalar/vector fields; Vector integral calculus, Green's theorem in plane, Divergence theorem, Stokes's theorem; A brief introduction to partial differential equations, Three fundamental equations, Fourier's method, Basics of integral transforms; Quantum Concepts: Schrödinger equation, Plane wave solutions, Quantum wells, Quantum tunnelling, Eigenvalue problem, Solution of the hydrogen atom; A Brief Account of Elasticity: Stress and strain, Relations in elasticity, Deformations and dynamical behaviour of solids; Essential Concepts in Nanoindentation; Nanoindentation of Thin Films.

İTN505 Nanocharacterisation I 3+0 7.5

Structural Characterization of Nanomaterials, Thermal Conductivity of Semiconductor Nanostructures, Characterization of Magnetic and Electronic Properties, Characterization of Nanostructured Materials by X-Ray Photoelectron Spectroscopy, X-Ray Microscopy and Nanodiffraction, X-Ray Characterization of Nanomaterials, Raman Spectroscopy

İTN506 Nanocharacterisation II 3+0 7.5

Crystallography and Shape of Nanoparticles; Microscopic Techniques; Scanning Tunneling Microscopy (STM), Atomic Force Microscopy (AFM), Scanning Probe Microscopy, Magnetic Force Microscopy (MFM), Scanning Hall Aygıtı Microscopy, Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM)

İTN507 Nanomaterials 3+0 7.5

Metal, Ceramic, Organic Molecular Group, Polimeric or Composite Materials, Nanoparticles, Nanotubes, Nanoporous Materials, Nanoporous Carbons, Nanomembranes, Nanofluids, Nanocontainers, Nanocapsules, Nanocables and Nanojunctions, Ferroelectric Nanomaterials, Nanowires, Nanoceramics (Ceramic Nanopowders), Nanobiomaterials, Nanotransistors, Nanofibers, Nanocrystals, Nanostructured Metals and Alloys, Magnetic Nanomaterials (Soft and Hard), Bismuth Nanostructured Materials, Superhard Nanocomposites, Polymeric Nanomaterials, Protein-Doped Nanoporous Silica Gels, C60-Based Materials, Colloidal Gold, Dye/Inorganic Nanocomposites, Metal Nano-Optics, Multifunctional Nanocomposites, Nanostructured Thin Films, Quantum Dots, Nanolayers, Nanocomposites

İTN508 Synthesis of Nanomaterials 3+0 7.5

Chemical Synthesis of Nanoparticles; Synthesis of Nanomaterials Using Microemulsion Process; Sol-Gel Method; Liposomes; Nanostructures Created by Lasers; Solid-State Synthesis of Carbon Nanotubes; Carbon Nanotube Synthesis by Arc Discharge Technique; Catalytic Synthesis of Carbon Nanotubes and Nanofibers; Synthesis of Inorganic Nanowires and Nanotubes; Synthetic Nanoinorganics by Biomolecular Templating; UHV-SPM Nanofabrication; Electrochemical Synthesis of Semiconductor and Metal Nanowires; Nanopowders Produced Using Microreactors; Nanocrystalline Ceramics by Mechanical Activation; Formation of Nanostructured Polymers.

İTN509 Nano-Biotechnology 3+0 7.5

Bionanodevices; Bionanomotors; Biological Nanomaterials; Biological Molecules in Nanodevices; Biogenic Nanoparticles; Bioelectronics; Nanobiosensors; Nanoanalysis of Biomaterials,

İTN510 Structure Property Relationship in Nanomaterials 3+0 7.5

Photochemistry; Photoconductivity; Photodynamic; Electrochemistry of Nanomaterials; Dynamic Processes in Magnetic Nanostructures; Diffusion in Nanomaterials; Nanoscale Heat Transfer; Catalysis by Gold Nanoparticles; Transport in Semiconductor Nanostructures; Transition Metal Atoms on Nanocarbon Surfaces; Nanomechanics of Nanoscale Materials; Nanodeposition of Soft Materials; Nanocatalysis; Electronic Structure of Semiconductor Nanoparticles; Kinetics in Nanostructured Materials; Mechanical Behavior of Nanomaterials

İTN511 Properties of Nanomaterials 3+0 7.5

Dielectric Properties of Nanomaterials, Characterization of Magnetic and Electronic Properties, Optical Properties of Nanomaterials, Thermodynamics Properties of Nanomaterials, Superplasticity of Nanoceramics

İTN512 Nanodevices and Design 3+0 7.5

Semiconductor Nanodevice Modeling; Single-Electron Devices; Single-Electron Transistors; Single-Electron Dynamics; Nanorobotics and Nanomanipulation; Mechanical Molecular Nanodevices; Nanocomputers: Theoretical Models; Optical Fibers for Nanodevices; Photochemical Molecular Devices; DNA-Based Nanodevices; Gas-Based Nanodevices; Micro and Nanomechanics

İTN513 Nanotechnology Applications in Textiles 3+0 7.5

Classification of Textile Materials; Textile Fibers and Properties; Type of Yarns and Spinning Systems; Nanotechnology Applications in Fibers and Yarns Production: Nanofibres; Electro spinning and Nanoadditives Used in Fiber Production; Textile Fabrics and Production Methods; Textile Finishing; Fabric Dying and Printing Technologies; Nanotechnology Applications in Textile Finishing: Water and oil repellency; Soil Release; Antimicrobial and Flame Retardant Finishes; Physical and Chemical Testing of Textiles; Characterization of Nanomaterials Applied on Textile Materials; Analyzing Textiles By SEM; Some Commercial Textile Products Based on Nanotechnology.

İTN514 Nanomagnetism and Applications 3+0 7.5

Introduction to magnetism; Magnetostatics; Micro-magnetism, domains and hysteresis; Nanoscale-magnetism; Experimental methods in nanoscale; Micro- and Nanoscale Magnetic materials; Application of soft magnets; Application of hard magnets; Application of magnetic nanoparticles; Application of magnetic nanoscale thin films; Spin Electronics, magnetic recording and memory; Special topics; Samples of industrial devices.

İTN515 Epitaxial Crystal Structures and Applications 3+0 7.5

Fundamentals of Ultra-High Vacuum: Vacuum chamber, Vacuum components, Vacuum gauges, Vacuum pumps, Temperature readers, Substrate holders, Extra accessories; Epitaxial Crystal Growth Techniques; Conditions for Epitaxial Crystal Growth; 2D Epitaxial Crystal Structures; 3D Epitaxial Crystal Structures; Characterization Techniques for Epitaxial Crystal Structures; Applications of Epitaxial Crystal Structures.

İTN517 Photovoltaic Technologies and Applications 4+0 7.5

Introduction to Photovoltaics: Past and present of photovoltaic technology; Photovoltaic Materials and Concept of P-N Junction; Physics of Solar Cells; Solar Cell Design and Optimization Rules; Crystalline and Thin Film Solar Cell Technologies; Very High Efficiency Multi-Junction Solar Cells and Concentrated Photovoltaics; Electrolyte and Organic Based Solar Cells; Characterization of Solar Cells and Modules; Economics of Photovoltaic Technologies; Terrestrial and Space Applications; Electrochemical Storage for Photovoltaics; Photovoltaics in Architecture.

İTN518 (Eng) Experimental Techniques for Nanotechnology 3+0 7.5

The Theory of Basic Processing Techniques: Diffusion, Oxidation, Photolithography, Chemical vapor deposition, Physical vapor deposition, Etching and metallization; Wave-Particle Duality: Photoelectric effect, X-ray diffraction, Compton effect, Related characterization techniques; Semiconductor Materials: Their properties and production techniques; Solid State Devices Basic Physics: Transistors, LEDs, Solar cells, Photodetectors and their fabrication techniques; Thin Films: Fabrication techniques, Vacuum technology, Growth mechanisms, Film characterization techniques, Surface treatments.

İTN519 (Eng) Introduction to Nanoscience and Nanotechnology 3+0 7.5

Historical Perspective of Nanotechnology; From Micro to Nanosystems; Introduction to the Concept of Nanoscience and Nanotechnology; Properties of Nanostructured Materials: Quantum dots, Quantum wires, Quantum wells; Synthesis of Nanomaterials; Electronic and Optical Properties of Selected Nanomaterials; Nanoscale Biomimetic Devices and Systems; Nanomaterials for Drug Delivery; Impact of Nanotechnology on the Environment.

İTN520 (Eng) Synthesis of Nanoparticles 3+0 7.5

Introduction to Nanoparticle Synthesis; Bottom-Up and Top-Down Syntheses; Solid Phase Synthesis; Mechanical Activation; Liquid Phase Synthesis; Hydrothermal Method; Solvothermal Method; Synthesis of Nanomaterials Using Microemulsion Process; Sol-Gel Method; Vapor Phase Fabrication; Spray Pyrolysis; Chemical Vapor Deposition; Synthetic Nanoinorganics by Biomolecular Templating; UHV-SPM Nanofabrication; Electrochemical Synthesis of Semiconductor and Metal Nanowires.

İTN521 (Eng) Nanotechnology and Society 3+0 7.5

Leaps in the History of Science and Technology; Nanotechnology: What is nanotechnology? Emerging applications of nanotechnology, Opportunities and challenges, Benefits and risks, Consumer products; Health and Safety Impact from Nanoparticles: Health issues, Environmental issues; Social Issues; Relation Between Technological and Social Changes; Social Acceptance of New Technologies, Public perception and understanding of nanotechnology; Impact of Nanotechnology; Socioeconomic Impacts, Education, Potential benefits and risks for developing countries; Government Support and Regulation of Risk; Nanoethics.

İTN522 (Eng) Introduction to Micro and Nano Fabrication 3+0 7.5

Cleanroom Environment, Safety and processing; Micro-nano Metrology; Silicon: Material Properties, Crystal structure, Growth, Wafers; Thin-Film Processes: PVD, CVD, PECVD, ALD; Thin-Film Materials and Processes: Metallic thin films, Oxide and nitride thin films, Polymer films, Stresses, Coverage metallic thin films, Oxide and nitride thin films, Polymer films; Pattern Generation and Optical Lithography: Photomasks as tools, Lithography process flow, Alignment and overlay, Exposure; Etching: Etching profiles, Anisotropic and isotropic wet etching, Plasma etching (RIE), Isotropic dry etching, Ion beam etching; Thermal Oxidation; Nano and Micro-Fabrication Equipment.

İTN523 (Eng) Physics and Technology for Infrared Detection 3+0 7.5

Electromagnetic Spectrum and Infrared Radiation: Atmospheric transmission and windows; Radiometry: Solid angle, Radiance, Emissivity, Planck's law and black body radiation; Optical Detection Processes; Thermal Detectors: Bolometers, Pyroelectric detectors, Thermoelectric detectors; Photon Detectors: Photoconductors, Photovoltaics, Detector types; Noise in Optical Detection: Noise sources and types; Figures of Merit in Optic Detectors: Responsivity, Signal-to-noise ratio, Noise equivalent power, Detectivity, BLIP and JOLI performance; Imaging Systems: Focal plane arrays.

İTN524 (Eng) Semiconductor Materials and Devices in Nanotechnology 3+0 7.5

Semiconductor Materials: Crystal Structure, Energy Bands, Density of States; Conduction Mechanism: Carrier Concentration, Donors and Acceptors, Mobility, Resistivity; Hall Effect, Carrier Diffusion, Generation and recombination processes; P-N Junction, Current-voltage characteristics; Transistors, LEDs, Solar cells, Photodetectors and their fabrication techniques; Thin films: Fabrication techniques, Vacuum technology, Growth mechanisms, Film characterization techniques, Surface treatments.

İTN525 (Eng) Nano-Electronic Devices 3+0 7.5

Introduction to Nanoelectronics and Nanoelectronics Roadmap: Electronic history, Scaling criteria, Emerging new nanoelectronic devices and concept of mesoscopic structures; Basic Semicondustor Device Physics and Device Architectures; Material Aspects of Nanoelectronics: Juntion formation and gating; Fabrication Techniques for Nanoelectronic Devices; Electrical and Transport Properties of Nanostructures; Nanoscale Transistors: Devices, Circuits and systems; Nanoelectronic Memories; Carbon Nanotube and Graphene Electronics; Spintronics: Materials and applications in nanoelectronics; Concepts for Emerging Systems and Architectures.

İTN527 (Eng) Basic Characterization Techniques in Nanotechnology 3+0 7.5

An introduction to the techniques for materials characterization; Scanning probe techniques: Scanning tunneling microscope (STM), Atomic force microscopy (AFM); Imaging characterization techniques: Optical microscopy, Scanning electron microscopy (SEM), Transmission electron microscopy (TEM); X-ray photoelectron spectroscopy (XPS); Secondary ion mass spectrometry (SIMS); Raman spectroscopy.

İTN528 (Eng) Nanotechnology Sensors 3+0 7.5

Introduction to Nanotechnology; Sensor and Nanotechnology Enabled Sensors; Sensor Characteristics; Physical Effects (Photoelectric; Photodielectric; Photoluminescence; Electroluminescence; Chemiluminescence; Doppler; Hall; Thermoelectric; Thermoresistive; Piezoresistive; Piezoelectric ;Magnetostriction; Mangnetoresistive); Transducers (Capacitive; Optical; Solid State; Electrochemical; Acoustic Wave); Inorganic Nanotechnology Enabled Sensors (Gas, Mechnical, Optical, Magnetic Sensors); Organic Nanotechnology Enabled Sensors (Biosensors, Nano-Sensors Based on Nucleotides and DNA, Biomagnetic Sensors.)

İTN529 (Eng) Machine Learning 3+0 7.5

Introduction: Machine learning concepts, Software tools; Supervised Learning: k-NN, Linear methods, Naive bayes classifier, SVM, Decision trees, Ensemble methods, Artificial neural networks; Dataset Transformations; Model Evaluation; Feature Selection; Unsupervised Methods: Clustering, Anomaly detection, PCA; Reinforcement Learning; Deep Learning: Convolutional neural networks, Recurrent neural networks, Autoencoders, Generative models

İTN530 (Eng) Nanobiosensors 3+0 7.5

Sensor and biosensor concept; Classification of sensors; Converter types; Biological agents used in the preparation of the recognition layer; Interaction mechanisms of biological agents with the monitored analyte; Basic principles of converter selection; Combining biological agent and translator; Immobilization methods; Types of signals; Tracking, evaluation and storage of the signal; Calibration lines; Contribution of nanotechnology to biosensor performance; On-chip laboratories; Other applications.

İTN531 (Eng) Computational Approaches in Nanomaterials 3+0 7.5

Introduction to Modelling Materials; Scale and dimensionality of nanomaterials; Simulation methods for different time and length scales; Useful Concepts in Molecular Modelling; Empirical Force Field Models: Molecular Mechanics; ab initio Methods, Density Functional Theory and Solid-state Quantum Mechanics Minimisation and Related Methods for Exploring the Energy Surface: Global and Local Optimisations; Global Optimisation methods: Genetic algorithm, basin hopping method, simulated annealing; Monte-Carlo simulation methods; Molecular Dynamics simulation methods; Overview of application areas of modelling materials in nanotechnology.

İTN532 (Eng) X-Ray Diffraction in Analysis of Thin Films 3+0 7.5

Crystal structures: Crystal systems, Miller indices, Lattice planes and directions, Crystal defects; Semiconductor heterostructures; Properties of X-rays: Spectrum, Absorption of X-rays, X-ray diffraction, Interaction with matter, Penetration depth; Components of X-ray diffractometer: Geometry of X-ray Diffractometer, X-ray source, Sample stage, Optics, Detector; Thin Film Applications: Rocking curve, Grazing incidence-exit, X-ray reflectivity, Reciprocal space map.

İTN533 (Eng) Nanotechnology and Biological Applications 3+0 7.5

Introduction to nanotechnology and its history; Structure of bionanomaterials: Nanoparticles, Nanorods, Nanowires, Nanofilms; Nanoparticle Production Methods for Different Application Areas; Properties of Bionanomaterials: Characteristics, Identification, Toxicity, Usage of bionanomaterials in disease and health; Medical Nanotechnology and Applications: Biosensor and nanochip applications, Targeted therapy; Electron Microscopic Method in Characterization of Nanoparticle: Size, Surface, Ultrastructure; Overview of Bionanomaterial Cytotoxicity Studies in Nanotechnology.

İTN534 (Eng) Chemistry and Applications of Organic Electronic Materials 3+0 7.5

Synthesis of organic materials (based on): Thiophenes, Tetrathiafulvalenes, Polyacetylenes, Poly(p-phenylene)s, Heteroaromatic materials; Low Band Conducting Materials; Polyphenylenevinylenes Materials; Macrocyclic Metal Complexes; Fullerenes (C60) and Their Optoelectronic Properties; Application of Conjugated Systems: Solar cells, Light emitting diodes, Electrochromic devices.

İTN535 (Eng) Transparent Ceramic and Glass-Ceramic Materials 3+0 7.5

Structural Conditions for Transparency; Introduction to Glass-ceramic Materials; Structure of Glass-ceramics: Transparent nano-crystalline glass-ceramics; Applications of transparent glass-ceramics; Recent Examples to Transparent Glass-ceramics and Their Processing Methods: Sintered aluminate glass-ceramics, Infrared transmitting glass-ceramics, Ce: YAG glass-ceramics for lighting; Introduction to Transparent Ceramic Materials; Optical Transmission Analysis; Characterization of Transparent Ceramics and Glass-ceramics by X-ray Diffraction and Electron Microscopy Methods.

İTN536 (Eng) Atomistic Simulation Laboratory 2+1 7.5

Introduction to Atomistic Modelling; Introduction to Linux Based Operation Systems; Linux, Concepts, Syntax and Basic Operations; Molecular Structures and Crystal Phases; Atomistical Visualization Programs; Atomistic Simulation Techniques; Energetical Minimization Examples with Interatomic Potentials: Molecular Structures and Crystal Phases; Energetical Minimization Examples with Quantum Mechanics: Molecular structures and crystal phases; Examples of Global Optimization; Examples of Molecular Dynamics Simulations.

İTN537 (Eng) Deep Learning and Artificial Neural Networks 3+0 7.5

Introduction; History; The Importance and Application Areas of Deep Learning; Structure of Artificial Neural Networks; CNN and Convolutional Layer Definition and Structure; Layers and Architecture of Artificial Neural Networks; Current and Successful Architectures; Smote and Data Augmentation Techniques; Image Preprocessing in Deep Learning; Unbalanced Classification and its Prevention Methods; Designing and Implementing a Deep Learning Architecture; Deep Learning Application with Public Data Sets; Success Metrics and Calculation Methods; The Importance of the Class Activation Map and Calculation Methods.

İTN592 Seminar 3+0 7.5

İTN592 (Eng) Seminar 3+0 7.5

İTN609 (Eng) Fundamentals of Semiconductor Devices and Technology 3+0 7.5

Elements of Quantum Mechanics: Basic formalism and Schrödinger equation, Particle in a box and quantum mechanical confinement; Energy-Band Theory: Kronig-Penney model, Particle motion and effective mass, E-k diagrams, Density of states, Fermi function; Semiconductors: Fundamentals, Doped-undoped structures, Fermi level, Electron and hole densities, Generation-recombination processes, Carrier transport; Devices and Operation Basics: P-n junction, Metal-oxide semiconductors, Bipolar junction transistors; Quantum Structures: Quantum wells, Quantum wires, Quantum dots.

İTN610 (Eng) Nano Imaging and Nano Analysis 3+0 7.5

Introduction to Nano Imaging and Nano Analysis: Requirements, Resolutions, Limitations; Specimen-Solid Interaction; Parts of Electron Microscopes: Gun, Lenses, Vacuum; Nano Imaging Techniques: Secondary electrons and in-lens imaging, Backscattered, Angular selective backscattered and energy selective bacscattered electron imaging, Bright field, Dark field

and high angle annular dark field imaging; Nano Chemical Analysis: Energy and wavelength dispersive x-ray analysis, Analysis with electron energy loss spectrometry; Nano Phase Analysis: Diffraction, Electron bacscattered diffraction, Precession electron diffraction.

İTN611 (Eng) Applied Quantum Mechanics 3+0 7.5

Quantum Mechanics and Technology; The Mathematical Formulation of Quantum Mechanics; Particles in Potentials; Tunneling and Applications in Technology; Hydrogen Atom Problem: Applications to doping and excitons in semiconductors; Physical Symetries and Conservation Laws: Band edges states in optical materials; Identical Particles and Second Quantization: Phonon, Plasmon, Polaron, Magnon; Time Dependent Problems: Electron-photon interactions (light absorptions and emissions), Electron-phonon interactions.

İTN612 (Eng) Molecular Beam Epitaxy:Principles and Applications 3+0 7.5

Epitaxy and Epitaxy Techniques; Molecular Beam Epitaxy: Fundamentals, Historical background; Physics of Epitaxy of Nanostructures: Quantum dots, Quantum wires, Quantum wells; In Situ Analytical Methods: Mass spectrometry, Surface analysis, Optical reflectance; Lattice Matching Considerations: Natural lattice matching, Forced lattice matching, Mismatched epitaxy; Overview of the Technology and Applications of Epitaxy.

İTN613 (Eng) Photovoltaics and Solar Energy Materials 3+0 7.5

Introduction to Photovoltaic and Solar Energy: The past and present of Photovoltaic technology, Photovoltaics: Terrastrial and space applications; Physics of Solar Cells: Concept of p-n junction under dark and illumination, Solar cell design, Characterization and optimization; Material Choices and Solar Cell Generations; Crystalline Material Solar Cells; Inorganic Thin Film Solar Cells; Thin Film Solar Cells Based on Organic and Electrolyte Based Materials; Third and Next Generation Solar Cell Concepts: Emerging new materiald based on nanotechnology in solar energy harvesting.

İTN614 (Eng) Nuclear Magnetic Resonance Spectroscopy 3+0 7.5

The Physical Basis of NMR Spectroscopy: Nuclear angular momentum and magnetic moment, Nuclei in a static magnetic field, The chemical shift: 1H and 13C chemical shifts of compounds, Spin-spin coupling and mechanisms: Spectrum analysis: Assignment of 1H and 13C signals: Relaxation mechanisms: Two dimensional NMR spectroscopy: Dynamic NMR spectroscopy: Interpretation of NMR spectra.

İTN615 (Eng) Electron Backscattered Diffractometry 3+0 7.5

Capabilities and Limitations of Electron Backscattered Diffractometry: Components of an electron backscattered diffractometry, Generation of diffraction patterns in electron backscattered diffractometry, Spatial resolution, The hough transformation, Indexing; Characterization and Representation of Texture: Euler angles, Rotations and orientations, Pole figures, Discrete orientations, Orientation distribution functions; Applications: Quantitative texture analysis, Grain boundary misorientation analysis, Phase analysis, Interpretation of line and planar defects, Stereological analysis.

İTN617 (Eng) Advanced Topics in Nanotechnology 3+0 7.5

Different Types of Materials in the Nanotechnology; Hybrid Inorganic-Organic Electronics, Shedding light on nanoscale materials; Nanophotonics; Plasmonics; Nano-Devices Based on Understanding the Device Physics as Well as the Nanofabrication Techniques Required to Construct Them; Nanostructured Thermoelectric Structures; The Different Dimensions of Nanotechnology: Zero dimensional, One dimensional, Two dimensional and three dimensional nano materials; State-of-the-Arts Devices; Future Trends.

İTN619 (Eng) Computation,Simulation and Modelling in Nanotechnology 3+0 7.5

Computer Simulation and Modelling to Predict the Physical Properties of Materials; Density Functional Theory; Prediction of Electronic, Mechanical, Dynamical and thermal properties of nanomaterials via density functional theory simulations; Molecular Dynamics Simulations and Classical Force Fields; Classical Force Field Generation for Nanomaterials; Prediction of Mechanical and Thermal Properties of Nanomaterials Via Molecular Dynamics Simulations.

İTN620 (Eng) Properties and Synthesis of Carbon Nanomaterials 3+0 7.5

Introduction to Carbon Element: Carbon hybridization and carbon allotropes; Graphite: Crystal structure and physical properties; Diamond: Crystal structure and physical properties; Nano Forms of Carbon: Types and Quantum Confinement in Carbon Nanomaterials; Fullerenes: Structure, Properties, Synthesis methods and applications; Carbon Nanotubes: Structure, Properties, Synthesis methods and applications; Graphene-Based Materials: Structure, Properties, Synthesis methods and applications; Nanodiamond: Structure, Properties, Synthesis methods and applications; Amorphous Nanocarbons.

İTN621 (Eng) Focussed Ion Beam Techniques for Nanofabrication 3+0 7.5

Introduction to Focused Ion Beams (FIB); Ion/Matter Interaction; Imaging With Ions; Micro and Nanofabrication: Milling and deposition for prototyping; SEM Sample Preparation for 2D Imaging and 3D Tomography; 2D and 3D Chemical Maps; 2D and 3D Phase Maps; Ion Implantation Damage and Redeposition During Ion Milling; He Ion Microscopy; Specimen

Preparation for Scanning Transmission Electron Microscopy and Atom Probe Tomography; Applications of FIB; FIB/SIMS; Laser + FIB/SEM; Plasma FIB.

İTN622 (Eng) Soft Materials 3+0 7.5

Basic Concepts in Materials Chemistry; Forces Between Atoms and Molecules: Strong intermolecular forces, Weak intermolecular forces; Polymeric Materials: Polymer synthesis, Structure, properties and morphology of polymers, Characterization of polymers, Polymer physics; Colloidal Materials; Self-assembly; Liquid Crystals; Biological Soft Materials; Applications of Soft Materials in Nanotechnology.

İTN623 (Eng) Reticular Materials 3+0 7.5

Metal-Organic Frameworks: Emergence of metal-organic frameworks, Determination and design of porosity, Building units of MOFs, Binary metal-organic frameworks, Complexity and heterogeneity in MOFs, Functionalization of MOFs; Covalent Organic Frameworks: Historical perspective on the discovery of covalent organic frameworks, Linkages in covalent organic frameworks, Reticular design of covalent organic frameworks; Applications of Reticular Materials: Basics of gas sorption and separation in MOFs, Hydrogen and methane storage in MOFs; Zeolitic Imidazolate Frameworks.

İTN625 (Eng) Advanced Functional Materials 3+0 7.5

Advanced Functions in Nanomagnetic Materials: Magneto-crystalline Anisotropy; RKKY and Exchange Interactions; Exchange Bias; Spin-dependent- and Magnetoresistance Effects; Permanent Magnets: Composites of ceramic, metallic and polymeric materials in nanoscale; Sensors and Smart Material's Applications: Position and Memory Effects in Artificial Intelligence; Advanced Functions in nanoscale Metal Oxide Semiconductor and Dielectric Materials: Mott Transition, Metal-Semiconductor- and Metal-Insulator Transitions; Phase Transition Materials; Opto-Electric, Thermo-Electric and Thermo-Mechanical Effects; Micro-Electro-Mechanical Systems: IR- Microwave and THz Sensors; Shape Memory Effect in nanoscale and Applications; Advanced Functional Materials for Solar and Fuel Cells.

İTN692 (Eng) Seminar 3+0 7.5

İTN790 Thesis 0+1 30.0

İTN790 (Eng) Thesis 0+1 30.0

İTN890 (Eng) Thesis 0+1 30.0

İTN890-0 (Eng) Thesis (Thesis Proposal) 0+1 30.0

KİM501 Selected Topics in Organic Chemistry I 3+0 7.5

General Principles of Kinetics and Thermodynamics and Chemical Reactivity; Aromaticy; Antiaromaticity; Hyperconjugation; Tautomerism; Hydrogen Bonding; EDA Complexes; Complexes of Crown Ethers and Related Compounds; Phase Transfer Catalysis; Classification of Reaction Mechanisms and Fundamental Reaction Mechanism Types; Basic Factors Influencing Acidity and Basicity.

KİM502 Selected Topics in Organic Chemistry II 3+0 7.5

Methods for Identification of Organic Reaction Mechanisms; Primary and Secondary Kinetic Isotope Effects; Stereochemical Proofs; Isolation of Reaction Intermediates; Substituent Effects; Chemistry of Organic Compounds Containing Boron; Phosphorus and Sulphur; Pericyclic Reactions; Radical Reactions; Photochemistry; Molecular Rearragements; Oxidation Reduction Reactions.

KİM504 Chemical Kinetics 3+0 7.5

Reactions Rate and Order; Zero; First-, Second-, Third Order Rate Equations; Kinetics of Complex Reactions; Kinetics of Chain Reactions, Molecular Reaction Dynamics; Collision Theory, Activated Complex Theory; Molecular Activation and

Types; Intermolecular Energy Transfer; Catalysis; Heterogeneous Catalysis; Homogeneous Catalysis; Fundamentals of Enzyme Kinetics.

KİM506 Polymer Chemistry 3+0 7.5

Concepts and Definitions; Classification of Polymers; Polymer Molecular Weights and Their Determination; Polymer Isomerism; Thermal Transitions and Mechanical Behavior; Step-Growth Polymerization; Chain- Growth Polymerization; Ionic and Coordinated Polymerization; Copolymers.

KİM509 Carbon-Carbon Bond Formation 3+0 7.5

Carbonion Alkylation; Enolate Alkylation; Asetilide-Cyanide Alkylation; Organometalic Alkylation; Addition to Carbonyl; Replacement Reactions; Aldol and Related Reactions; Claisen and Related Reactions; Organometalic Reactions; Witting Type Reactions; Asetilide-Cyanide Reactions; Conjugate Addition Reactions; Reactions of Alkenes; Alkenes; Alkynes; and Some Aromatic Compounds; Pericylic Reactions; and Friedel-Crafts and Related Reactions.

KİM510 Advanced NMR Techniques 3+0 7.5

Introduction to NMR theory; FT-NMR; Pulse NMR; Dynamic NMR; High Field NMR; One Dimensional NMR: Dept45, Dept90, Dept145, Inept, NOESY; Two Dimensional NMR: COSY, HETCOR, HMBC, HMQC, INADEQUATE.

KİM511 Electrochemistry 3+0 7.5

Electrochemistry; Ionic Interactions; The Conducting Properties of Electrolytes; Potantiometric Measurements, Electrode Systems; Electro-analytical Techniques; Conductometric Titrations; Potentiometric Titrations; Ultramicroelectrodes; Electrochemical Sensors; Ion-Selective Electrodes; Chemically Modified Electrodes; Enzyme Electrodes; Electrochemistry in Industry; Water Purification; Inorganic Electrolytic Processes; Organic Electrosynthesis; Fuel Cells; Electrolysis; Corrosion; Types of Corrosion; Electrochemical Methods of Avoiding Corrosion.

KİM513 Chemical Thermodynamics 3+0 7.5

The First Law of Thermodynamics; Work; Heat; Internal Energy; Enthalpy; Changes of State; The Second Law of Thermodynamics; Carnot Cycle; Heat Engine; Entropy; Criterion for the Direction of Spontaneous Change; Clausius Inequality; Thermo chemistry; Free Energy and Equilibria; Standard Molar Free Energy; Chemical Potential; Pressure and Temperature Dependence of Free Energy; Fugacity; Thermodynamics of Multi component Systems; Ideal Solution; Real Solutions; Partial Molar Quantities; Colligate Properties; Phase Equilibria; Phase Rule; Phase Diagrams; Thermodynamics of Non-Ideal Systems; The Third Law of Thermodynamics.

KİM515 Complexes Chemistry 3+0 7.5

Coordination Compounds: Overview of nomenclatures, Formation and stability of complexes in solution; Bonding in Coordination Compounds: Valence band theory, Crystal field theory, Ligand field theory, Molecular orbital theory, comparisons of the theories, Coordination number in complexes and effect on stability; Importance of Coordination Compounds and Application Areas; Electronic Spectra of Transition Metal Complexes: Ligand spectra, Counter-ion spectra, Charge-transfer spectra, Ligand field spectra, Synthesis of Coordination Compounds: Sigma-bonded coordination compounds, Substitution reactions in aqueous solution, Direct synthesis of the complexes, Oxidation-reduction reactions; Pi-Acid Ligand Complexes.

KİM516 Physical Organic Chemistry 3+0 7.5

Models of Chemical Bonding; Kinetics and Thermodynamics; Acids and Bases; Electrophiles and Nucleophiles; Correlation of structure with Reactivity; Hammett and Taft Equations; LFER; Solvent Effects, Kinetic Istope Effects; Steric and Conformational Properties; Homogeneous Catalysis; Acid and Base Catalysis; Specific and General Catalysis; Proton Transfers; Bronsted Catalysis Law; Discussion of Reactions in Terms of Mechanistic Properties.

KİM517 Selected Topics in Inorganic Chemistry I 3+0 7.5

Atomic Structure: Atomic orbital, Schrödinger Equation, Many-electron atoms; Molecular Orbital: Formation of molecular orbital from s, p and d orbital, Heteronuclear and diatomic molecules; Molecular Symmetry: Symmetry operations and symmetry elements, Point Grups, Application of symmetry; Acids, bases and ions in aqueous solution: Definitions of acids and bases, Hard-soft acids and bases, strength of acids and basis.

KİM518 Selected Topics in Inorganic Chemistry II 3+0 7.5

Crystal Structure; Lattice energy, Thermodynamics of the formation of ionic solids, band structure, conductivity; Chemistry of Main Group Elements: General physical and chemical properties and reactivity; d-block chemistry; physical and chemical properties, reactivity of metals; Redox Reactions in Inorganic Compound; Nuclear Properties: Nuclear bonding energy, Applications of isotopes.

KİM519 Heterocyclic Chemistry I 3+0 7.5

Heterocyclic Systems Similar to Cyclopropane: Azirine, Aziridine, Oxyrane (ethylene Oxide), Thirane, Diazirene, Diaziridine, Oxaziridine; Heterocyclic Systems Similar to Cyclobutane: Azetidine, Azitidinone, Oxetene, Oxetane, Oxetanone, Thietene, Thietane; Four Membered Rings with Two Heteroatoms.

KİM520 Heterocyclic Chemistry II 3+0 7.5

One-Heteroatom Rings similar to Cyclopentadiene: Pyrrole, Furan, Thiophen, Comparison of Aromatic Properties of Furan and Thiophen; Other Heteroatom Containing Heterocyclic; Pyrrole, Furan and Thiophen Containing Fused Heterocyclics; Other Fused Heterocyclics.

KİM521 Adsorption 3+0 7.5

Adsorption and Surface Phenomenon; Adsorption; Adsorption of Gases on Solids; Heat of Adsorption; Physical Adsorption; Chemical Adsorption; Monolayer Adsorption; Multilayer Adsorption; Adsorption Isotherms; Langmuir Adsorption Isotherm; The BET and Other Isotherms; Surface Area Determination; The Solid-Liquid Interface-Adsorption from Solution; Interactions at Solid-Solution Interface; Capillarity: Surface Tension and Surface Free Energy; Surface Films; Wetting and Detergency.

KİM522 Bioanalytical Chemistry 3+0 7.5

Introduction to Bioanalytical Chemistry; Physical, Chemical and Biological Properties of Biomolecules; Biological Sampling and Points to Consider While Working with Biomolecules; Bioanalytical Sample Preparation Techniques; Choice of Appropriate Analysis Method by Using Properties of Biomolecules; Analysis of Biomolecules by SDSandGel Electrophoresis Methods; Analysis of Biomolecules by Capillary Electrophoresis Techniques; Analysis of Biomolecules by HPLC and FPLC Methods; Analysis of Biomolecules by Hybrid MS Techniques; Analysis of Biomolecules by MALDI-TOF-MS; Analysis of Biomolecules by Other Methods; Bioanalytical Validation.

KİM523 Complex Equilibria in Analytical Chemistry 3+0 7.5

Mathematical Methods Used in Equilibrium Calculations; Mass and Charge Balances, Proton Condition; Strong and Weak Acids-Bases; Buffer Solutions and Logarithmic Concentration Diagrams; Hydrolysis of Salts of Weak Acids and Bases; Polyprotic Acids and Bases: Logarithmic concentration diagrams of solutions of polyprotic salts; Mixture of Two Weak Monoprotic Acids and Multiple Buffer Systems; Solubility of Poliprotic Acid Salts; Precipitation and Solubility: Separation with precipitation, Precipitation titrations; Solubility of Weak Monoprotic Acid Salts.

KİM524 Bioinorganic Chemistry 3+0 7.5

Biological Functions of Inorganic Elements; Biological Ligands for Metal Ions; Metals at the Center of Photosynthesis; Catalyses through Hemoproteins; Iron-Containing Biological Proteins; Nickel-Containing Enzymes; Copper-containing Protein; Biological Functions of Transition Metals; Zinc and Enzymatic Catalysis; Biomimic Chemistry; Biominerals; Bioinorganic Chemistry of the Toxic Metals; Chemotherapy, Imaging and Other Applications of the Nonessential Elements.

KİM525 Quantum Chemistry 3+0 7.5

Introduction to Quantum Chemistry; Traveling Waves and Equations; Electromagnetic Theory; Quantum Mechanics of Some Simple Systems; The One-Dimensional Harmonic Oscillator; The Quantum Mechanics Applications of Atoms; The Particle in e One-Dimensional Box; The Particle in a One-Dimensional Box for Wave Functionals and Momentum; The Hydrogen Atoms for Quantum Chemistry; Introduction to Some Concepts of Quantum Mechanics and the Theoretical Basis of the Chemical Bonds; Introduction to Some Chemical Bonds of Molecular Orbitals as Linear Combinations of Atomic Orbitals (LCAO) and Basics Procedure for Quantum Mechanical Mixing of a Atomic Orbitals Solution for Molecular Orbital Functions; Determination of the Molecular Orbitals Wave Functions; Approach LCAO Methods for the P-Bond Systems; Electron Density; Charge Density; Bond Order.

KİM526 Microwave Organic Synthesis 3+0 7.5

Microwave Assisted Organic Chemistry (MAOS) A Brief History; Microwave Theory; Microwave Equipments; Microwave Processing Techniques; Designing Reaction using Microwave; Comparison of Microwave Synthesis and Conventional Synthesis; Practical Applications of CEM Discover Microwave Equipment.

KİM529 Catalytic Chemistry 3+0 7.5

Catalysis in Solutions; Acid-base Catalysis; Catalysis By Electron Transfer; Organmetallic Catalysis; Catalysis By Macromolecules; Phase Transfer Catalysis; Catalysis By Enzymes; Structure of Enzymes; Reactions Catalyzed By Enzymes; Catalysis By Polymers; Structures of Polymers; Other Polymer Catalysis; Catalysis on Surfaces; Surface Structures; Adsorption, Surface Catalysis; Catalysis on Metal Surfaces; Other Metal Catalysis.

KİM531 Modern Analysis Methods I 3+0 7.5

Introduction to Molecular Spectroscopy and Differences With Atomic Spectroscopy; Infrared (IR) Spectroscopy and Applications; Microwave Spectroscopy; Raman Spectroscopy and CARS Applications; Electron Spin Resonance

Spectroscopy; New Applications of NMR Spectroscopy; Dynamic Nuclear Magnetic Resonance; Double Resonance Technique; NO Technique; NMR With Solid Samples; 13C-NMR; 19F-NMR And 31P-NMR Spectroscopy; Thermal Analysis Methods; Thermogravimetry; Differential Thermal Analysis.

KİM532 Modern Analysis Methods II 3+0 7.5

Theory of Atomic Spectroscopy; Atomic Absorption Spectrometry and Applications; Atomic Emission Spectroscopy and Applications; Atomic Fluorescence Spectrometry and Applications; Laser Source Atomic Spectroscopy and Applications, X-Ray Spectrometry; Mössbauer Spectroscopy, ESCA Spectroscopy and Applications; Radiochemical Methods; Spectroscopy, Neutron Activation Analysis and Other Nuclear Techniques.

KİM533 Electroanalytical Chemistry 3+0 7.5

Principles of Electroanalytical Methods; Electrochemical Cells; Cell and Electrode Potentials; Electrode Types; Potentiometric Methods; Potentiometric Titrations; Voltammetric Methods; Linear-Sweep Voltammetry; Cyclic Voltammetry; Polarographic Methods; Puls Polarography; Alternative Current Polarography; Stripping Methods; Analytical Applications; Amperometric and Coulometric Methods; Amperometric and Coulometric Titrations; Conductometric Methods; Measurement of Conductance; Conductometric Titrations; Spectroelectrochemistry.

KİM534 Organometallic Chemistry 3+0 7.5

Overview of Organometallic Chemistry; Fundamentals of Structure and Bonding; Electron Rule; Carbonyl Ligands; Pi Ligands; Other Important Ligands; Organometallic Reactions I; Organometallic Reactions II; Homogeneous Catalysis; Transitions Metal-Carbene and Transitions-Metal Carbyne Complexes; Applications of Organometallic Chemistry to Organic Synthesis; Other Applications of Organometallic Chemistry.

KİM535 Data Analysis in Chemistry 3+0 7.5

Basic Statistics: a Review; Errors; Accuracy; Precision; Reducing Systematic Errors; Mean and Standard Deviation; Distribution of Random Errors; Reliability of Results; Confidence Interval; Comparison of Results; The T-Test; Analysis of Variance; Signal Detection and Manipulation; Signal Detection; Point Estimation of the Detection Limit; The Wilcoxon Test; Signal Manipulation; Curve Fitting; Smoothing of Data; Least-Squares Polynomial Smoothing; Differentiation of the Signal; Calibration and Chemical Analysis; Comparison With Standards; Constructing a Calibration Curve; Utilizing the Calibration Curve for Chemical Analysis; Resolution of Analytical Signals; Exploratory Data Analysis: Processing Techniques; Graphical Methods; Partial Least Squares Path Modelling; Control and Optimization.

KİM536 Chromatographic Techniques 3+0 7.5

Introduction to Chromatographic Techniques; Classification of Chromatographic Techniques; Planar Chromatographic Techniques and Applications; Gas Chromatography and Hybrid Systems; Supercritical Fluid Chromatography; Gel Permeation Chromatography and Applications; Electrochromatographic Methods; Gel Electrophoresis; Capillary Electrophoresis and Applications

KİM537 Organic Macro Molecules 3+0 7.5

Enzymes, Non-enzyme Soluble Proteins; Calcium Binding Proteins; Integral Membrane Proteins; DNA, RNA, Protein Complex to Nucleic Acid; Virus Components, Immune System, Toxins, Carbohydrates; Unusual Tertiary and Quaternary Structures; Protein Crystals; History of Earliest Crystallographic Structures.

KİM539 Quantitative Structure Property Relationship 3+0 7.5

Molecular mechanics, ab initio, and semi-empirical calculations.

KİM550 Reagents In Organic Synthesis 3+0 7.5

Oxidizing and Reducing Reagents; Oxidizing and Reducing Reagents; Classification and Reactions; Activating Agents and Protecting Groups: Reagents and protecting groups for elimination reactions, Acylation, Ether formation, Protection of diols, Amines, Carbonyl groups and reagents, Sulfonylation reagents; Reagents and Catalysts for C-C Bond Formation: Acetylenes and allenes, Aluminum, Boron, Copper, Cyano, Isocyanato, Diazo, Azido, Dienes, Dienophyles, Enolates, Epoxides, Halo compounds, Imines, Ketenes,Lithium, Magnesium, Phosphorus, Sulfur, Zinc, Nickel; Acidic and Basic Reagents; Acidic and Basic Catalysts; Using Lewis Acid; Hydrolyses and Enzymatic Reagents.

KİM551 Sensors and Their Applications 3+0 7.5

Sensor Technology; Introduction to Chemical Sensors; Optical Methods and Sensors: Sensor techniques in optics, evanescent waves, spectroscopy, surface plasmon resonance, Fiber Optics; Mass Sensitive Sensors: piezoelectric sensors, quartz crystal microbalance, Surface Acoustic Waves; Biosensors: Biomaterials for biosensors, enzymes, enzyme structure, antibodies, antibody structure, production of antibodies, detection of antibody-antigen binding, immobilization techniques of biomolecules, Preparation Techniques of Chemical Sensors, Evaluation of Sensor Signal, General Analytical Applications.

KİM558 Biochromatography 3+0 7.5

Theory of Biochromatography; Gel Filtration; Ion Exchange Interaction Biochromatography; Hydrophobic Interaction Chromatography Of Proteins; Affinity Chromatography; Dye Ligand Affinity Chromatography; Immobilized Synthetic Dyes in Affinity Chromatography; Immobilized Pseudospesific Ligands In Affinity Chromatography; Immobilized Metal-Ion Affinity Chromatography; Intelligent Polymers, Imprinted Polymers; Biomedical Applications of Biochromatography.

KİM560 Alternative Reaction Systems 3+0 7.5

Ionic Liquids; Physical properties of ionic liquids, synthesis of ionic liquids, Multıphasıc Solvent Systems; Aqueous biphasic systems, Florous biphasic systems, Properties of perfluorinated solvents, Triphasic systems, Supercrıtıcal Fluıds; Physical properties of supercritical fluids, Chemical reactions in supercritical media, Catalytıc Reactıons In Altarnatıve Reactıon Systems; Hydrogenation, Hydroformylation, Diels-Alder, Oxidation, Carbon ?Carbon Bond Formation, Metathesis, Polymerization

KİM561 Novel Tendencies in Liquid Chromatography 3+0 7.5

Introduction to High Performance Liquid Chromatography (HPLC); Devolopment of Method in Liquid Chromatography (LC); Qualitative and Quantative Analysis; Column Preperation Techniques in LC; Micro-Nano LC; Fast Protein Liquid Chromatography (FPLC) and Ultra Fast Liquid Chromatography (UFLC) Systems; Researching of Other Novel LC Techniques; Evaluation of Analysis in LC; Applications of LC.

KİM562 Inorganic Polymers 3+0 7.5

Definition and classification of inorganic polymers; Polymeric sulfur, selenium, tellurium; Linear polyphosphates, polyphosphazenes, polycarboranes, poly(sulfurnitride); Chalcogen glasses Borate, borophosphate and borosilicate glasses; Boron-nitride and phosphor-oxynitride polymers; Crystalline silicates and aluminum phosphates; Synthetic inorganic fibers; Technological applications of inorganic polymers.

KİM563 Natural Product Synthesis I 3+0 7.5

Total Synthesis of Carbohydrates; Total Synthesis of Prostaglandins; Total Synthesis of Pyrrole Pigments; Total Synthesis of Nucleic Acids; Total Synthesis of Antibiotics; Synthesis of Monoterpenes; Total Synthesis of Sesquiterpenes; Synthesis of Triterpenes; Naturally Occurring Aromatic Steroids; Total Syntheses of Isoquinoline Alkaloids; Synthesis of Indole Alkaloids; Alkaloid Synthesis; Synthesis of Insect Pheromones; Total Synthesis of Cannabinoids; Total Synthesis of Ionophores; Synthesis of Prostaglandins; Synthesis of Monoterpene.

KİM564 Natural Product Synthesis II 3+0 7.5

Total Synthesis of Macrocyclic Lactones; Synthesis of the Leukotrienes; Synthesis of Monoterpenes; Total Synthesis of Aromatic Steroids; Gene Synthesis; Total Synthesis of Triterpeaes; Total Synthesis of Carbohydrates; Total Synthesis of Pyrrole Pigments; Total Synthesis of Tri- and Tetracyclic Diterpenes; Synthesis of Polysaccharides; Total Synthesis of Naturally Occurring Quinones; Total Synthesis of Spiroketal-Containing Natural Products; Synthesis of Insect Pheromones; Acyclic Sesquıterpenes; Monocyclıc Sesquıterpenes; Bicyclic Sesquiterpenes; Tricyclic Sesquiterpenes.

KİM565 Literature Search in Chemistry 3+0 7.5

Search for Authors by Using SciFinder Program; Search for Patents by Using SciFinder Program; Search for Journals by Using SciFinder Program; Search by Topics by Using SciFinder Program; Search for Chemical Substances by Using SciFinder Program; Search for Reactions by Using SciFinder Program; Chemical Abstract Search in Library; Search for Topics Using Web of Science; Search for Authors by Using Web of Science; Search for Citations by Using Web of Science; Getting Data from Council of Higher Education and The Scientific and Technological Research Council of Turkey; Using other Search Engines.

KİM566 Stereo Selective Reactions and Practical Approach 3+0 7.5

General Concepts of Stereoselective Synthesis; Characterization of Stereoisomers; Analysis of Conformation and Configuration; Stereoselective Catalytic Reductions; Stereoselective Non-Catalytic Reductions; Stereoselective Oxidations; Stereoselective Carbon-Carbon Bond Forming Reactions by Nucleophilic Addition to Carbonyl Groups; Stereoselective Carbon-Carbon Bond Forming Reactions; Stereoselective Carbon-Carbon Bond Formation by Pericyclic Reactions; Stereoselective Formation of Carbon-Heteroatom Bonds; Stereoselective Formation of Carbon-Nitrogen Carbon-Phosphorus; Carbon-Oxygen; Carbon- Sulfur and Carbon-Halogen Bonds.

KİM567 Applications of Computational Chemistry 3+0 7.5

ChemOffice Package Program: Molecule drawing with ChemDraw programme; Molecule drawing and the data preparation with chem3D programme; Mopac Package Program: Calculations with mopac programme in chem3D; Calculations with mopac2009 programme; Cache Package Program: Semi-empirical and ab initio; Spartan Package Program: Semi-empirical and ab initio; Gabedit Program: Mopac and gaussian; Gaussian Package Program; GaussView Package Program; Other Computing Programs.

KİM568 Solvent-free Organic Synthesis 3+0 7.5

Solvent-Free Reduction; Solvent-Free Oxidation; Solvent-Free Carbon?Carbon Bond Formation; Solvent-Free Carbon?Nitrogen Bond Formation; Solvent-Free Carbon?Oxygen Bond Formation; Solvent-Free Carbon?Sulphur Bond Formation; Solvent-Free Carbon?Phosphorus Bond Formation; Solvent-Free Carbon?Halogen Bond Formation; Solvent-Free Nitrogen?Nitrogen Bond Formation; Solvent-Free Rearrangement; Solvent-Free Elimination; Solvent-Free Hydrolysis; Solvent-Free Protection; Solvent-Free Deprotection; Solvent-Free Reactions under Microwave Irradiation.

KİM569 Structure Determination of Organic Chemistry 3+0 7.5

Separation and purification of organic compounds; Determination of physical characteristics; Elemenl analysis of organic compounds; The general principle of Ultraviolet (UV), Infrared (IR), nuclear magnetic resonance (NMR) and mass spectroscopy methods; Importance of structural analysis of organic compounds; Interpretation of NMR; IR and UV spectra together; Structure determination applications of selected specific examples using NMR, IR, UV, and mass spectroscopy.

KİM571 Molecular and Cellular Biochemistry 3+0 7.5

Foundations of Biochemistry; Principles of Bioenergetics; Glycolysis, Gluconeogenesis; Principles of Metabolic Regulation: Regulation of metabolic pathways, Coordinated regulation of glycolysis and gluconeogenesis, Analysis of metabolic control; The Citric Acid Cycle; Fatty Acid Catabolism: Digestion, mobilization and transport of fats, Oxidation of fatty acids, Ketone bodies; Amino Acid Oxidation and Production of Urea; Carbohydrate Synthesis in Plants and Bacteria; Lipid Biosynthesis; Biosynthesis of Amino Acids, Nucleotides; DNA Metabolism; RNA Metabolism; Protein Metabolism; Regulation of Gene Expression.

KİM583 Modern Analysis Methods I 3+0 7.5

Theory of Atomic Spectroscopy; Atomic Absorption Spectrometry and Applications; Atomic Emission Spectroscopy and Applications; Atomic Fluorescence Spectrometry and Applications; Laser Source Atomic Spectroscopy and Applications, X-Ray Spectrometry; Mössbauer Spectroscopy, ESCA Spectroscopy and Applications; Radiochemical Methods; -Spectroscopy; Neutron Activation Analysis and Other Nuclear Techniques.

KİM584 Modern Analysis Methods II 3+0 7.5

Introduction to Molecular Spectroscopy and Differences With Atomic Spectroscopy; Infrared (IR) Spectroscopy and Applications; Microwave Spectroscopy; Raman Spectroscopy and CARS Applications; Electron Spin Resonance Spectroscopy; New Applications of NMR Spectroscopy; Dynamic Nuclear Magnetic Resonance; Double Resonance Technique; NO Technique; NMR With Solid Samples; 13C-NMR; 19F-NMR and 31P-NMR Spectroscopy; Thermal Analysis Methods; Thermogravimetry; Differential Thermal Analysis.

KİM585 Name Reactions in Organic Chemistry 3+0 6.0

Name Reactions in the Chemistry of Heterocyclic Compounds; Displacement Reactions; Addition Reactions; Coupling Reactions; Name Reactions for the Formation of Olefins; Aldehyde-Ketone Reactions; Condensation Reactions; Cyclic Reactions to Ring Formation; Reduction-Oxidation Reactions; Reactions of Amines.

KİM586 Sensor Technology 3+0 6.0

Introduction to Sensor Technology; Types of Sensors; Chemical Sensors; Chemical Sensor Components; Electrochemical Sensors; Biosensors; Biomaterials for Biosensors; Molecular Recognition; Quartz Crystal Microbalance; Surface Plasmon Resonance Spectroscopy; Reflectometric Interference Spectroscopy; Analytic Applications.

KİM587 Alternative Reaction Systems 3+0 6.0

Ionic Liquids: Physical properties of ionic liquids, Synthesis of ionic liquids; Multiphasic Solvent Systems: Aqueous biphasic systems, Fluorous biphasic systems, Properties of perfluorinated solvents, Triphasic systems; Supercritical Fluids: Physical properties of supercritical fluids, Chemical reactions in supercritical media; Catalytic Reactions in Alternative Reaction Systems: Hydrogenation, Hydroformylation, Diels-Alder, Oxidation, Carbon-carbon bond formation, Metathesis, Polymerization.

KİM588 Computational Chemistry Applications 0+3 6.0

ChemOffice: Use of Chem3D in molecule drawing, Preparing data file on Chem3D program for Mopac, Gaussian, etc.; Mopac: Calculations on Mopac; GaussView: Molecule drawing on GaussView program, Preparing the calculation file on GaussView program; Gaussian: Preparing the calculation file on Gaussian program, Keywords used in Gaussian, Calculation on Gaussian, Analysis of the calculated results, Investigation of calculations results; Other Calculation Software.

KİM589 Adsorption 3+0 6.0

Adsorption; Adsorption of Gases on Solids; Heat of Adsorption; Physical Adsorption; Chemical Adsorption; Monolayer Adsorption; Multilayer Adsorption; Adsorption Isotherms; Langmuir Adsorption Isotherm; The BET and Other Isotherms; Surface Area Determination; The Solid-Liquid Interface-Adsorption from Solution; Interactions at Solid-Solution Interface.

KİM591 Thermal and Surface Characterization Methods 3+0 6.0

Material: Classification of materials, Importance of material characterization; Surface Analysis by Gas Adsorption: Adsorption, Properties and types of adsorbents, Porosity, Surface area, Adsorption isotherms, BET theory, Surface characterization via BET instrument; Particle Size and Zeta Potential Measurements via Zetameter: Zeta potential, Isoelectric point, Measurements by zetameter; Thermal Characterization Methods: Analyses of thermogravimetry, Differential thermogravimetry and Differential scanning calorimetry, Dilatometry; Microscopic Methods: Optical, Scanning electron, Transmission, Scanning tunnelling and Atomic force microscopy; X-ray Methods: X-ray fluorescence spectroscopy, X-ray photoelectron spectroscopy, X-ray diffraction analysis; Some Spectroscopic Methods.

KİM592 Seminar 3+0 7.5

KİM593 Applications of Modern Analysis Methods I 0+3 6.0

Fluorescence and Phosphorescence Spectroscopy: Applications of fluorescence spectroscopy; Elemental Analyzer: Applications of elemental analyzer; Ion Exchange Chromatography: Applications of ion exchange chromatography; Atomic Absorption Spectroscopy (AAS): Applications of atomic absorption spectroscopy; Scanning Electron Microscope (SEM): Applications of scanning electron microscopy; Thermogravimetric Analysis (TGA): Applications of thermogravimetric analysis; Zeta Potential Device: Zeta potential field applications.

KİM594 Applications of Modern Analysis Methods II 0+3 6.0

Refractometer: Finding refractive index of compounds; Polarimetry: Investigating the decomposition kinetics of sugar, Finding the rotating angle of maltose and lactose; UV- Visible Spectroscopy: Its use in qualitative and quantitative analysis; Infrared Spectroscopy: Determination of functional groups in organic compounds and structure of unknown substances; Nuclear Magnetic Resonance Spectroscopy (NMR): Illumination of structure of unknown organic compounds; High Pressure Liquid Chromatography (HPLC): Making quantitative analysis; Gas Chromatography (GC): Making quantitative analysis; Gas Chromatography-Mass Spectrometer (GC-MS): Analyzing the composition of known and unknown compounds.

KİM595 Analytical Method Development Validation 3+0 6.0

Chemical Analysis Method and Its Steps; Steps of Quantitative Analysis; Method Calibration; Analytical Method Development and Validation; Validation Process; Qualification; Good Laboratory Practice (GLP); Current Good Manufacturing Practice (cGMP); ISO 9000 (TickIT); Method Development, Optimization and Validation Approaches: Method Validation; Organisations and Guides for Method Validation; Method Validation: Terminology and definitions: Accuracy, Precision, Error, Standard deviation; Confidence Ranges; Statistical Aids to Hypothesis Testing; Q Test; Method Validation Parameters (ICH/USP): Accuracy, Precision, Specificity, Limit of Detection, Limit of quantification, Linearity and range, Ruggedness, Robustness, Data elements required for assay validation; System Suitability (USP); Method Validation Protocol; Method Transfer and Revalidation.

KİM596 Chemistry of Main Elements 3+0 6.0

General Properties of Main Elements: Classification, General physical and chemical properties; Periodicity: Atomic and ionic radii, Electronegativity, Ionization energy, Electron affinity; Chemistry of Hydrogen Atom; Chemistry of IA Group Elements: Reactivity, Compounds, Daily usage; Chemistry of IIIA Group Elements; Chemistry of IVA Group Elements; Chemistry of VA Group Elements; Chemistry of VIA Group Elements; Chemistry of VIIA Group Elements; Chemistry of VIIIA Group Elements.

KİM598 Term Project 3+0 0.0

KİM601 Investigations of Mechanisms in Organic Chemistry I 3+0 7.5

Kinds of Organic Reactions; How Organic Reactions Occur; Aliphatic Nucleophilic Substitution: General features of Aliphatic Nucleuphilic Substitution; Ion Pairs as Intermediate in Nucleophilic Substitution; Influence of Solvent; Nucleophile; Leaving Group; Intramolecular Cationic Rearrangements; 1,2-Shifts In Carbenium Ions; Carbonium Ions; Migrations to Carbonyl Ğroup; Rearrangements to Electron-Deficient Nitrogen and Oxygen; Carbanion; Carbens and Electrophilic Aliphatic Substitution.

KİM602 Investigations of Mechanisms in Organic Chemistry II 3+0 7.5

Addition and Elimination Reactions; Electrophilic Addition to Double and Triple Bonds; 1,2-Elimination Reactions; Nucleophilic Addition to Multiple Bonds; Electrophilic Aromatic Substitution; Nucleophilic Aromatic Substitution; Reactions of Carbonyl Compounds; Hydration and Acid-Base Catalysis; Other Simple Additions; Addition Followed By Elimination; Addition of Nitrogen Nucleophiles; Carboxylic Acid Derivatives; Enols; Enrolates, And Addition of Carbon Nucleophiles to C=O Bond; Cycloaddition Reactions; Electrocyclic Reactions; Sigmatropic Reactions.

KİM603 Organic Synthesis 3+0 7.5

Designing Organic Syntheses and the Disconnetion approach; The Order of Even Chemoselectivity; Stereoselectivity; Regioselectivity; Protecting Groups; One-Group C-C Disconnections and Carbonyl Compounds; Two-Group Disconnections; 1,2-; 1,3-; 1,4-; 1,5-; 1,6- Difunctionalised Compounds; Use of Acetylenes.

KİM606 Molecular Symmetry and Spectroscopy 3+0 7.5

Symmetry Elements; Symmetry Point Groups; Matrix Representations; Reducible and Irreducible Representations; Character Tables; Representations and Quantum Mechanics; Molecular Vibrations; Molecular Orbital Theory and Symmetry; Hybrid Orbitals; Transition Metal Complexes.

KİM609 Advanced Polymer Chemistry 3+0 7.5

Thermal, Mechanical, Chemical, Electrical and Optical Properties of Polymers; Polymer Mixtures; Solubility Parameters, Flory-Huggins theory; Polymer Characterization; Miscellaneous Polymerisations; Polymer Modification; Polymeric Reagents and Catalysts; Commercial Polymerisations.

KİM612 Pericyclic Chemistry 3+0 7.5

Fundamentals of Pericylic Reactions; Electrocyclic Reactions; Cyloaddition Reactions; [2+2] Reactions; [4+2] Cycloaddition Reactions; Intra and Intermolecular Diels-Alder Reactions; 1,3-Dipolar Reactions; Chelatropic Reactions; Ene and Related Reactions.

KİM614 Conducting Polymers 3+0 7.5

Basics of Conducting Polymers; Doping and Conductivity Properties; Synthesis of Conducting Polymers; Semiconductor Models for Conducting Polymers; Electrochromic Properties; Electrochemistry of Conducting Polymers; Solubility and Processing of Conducting Polymers; Characterization Methods; Application Fields of Conducting Polymers.

KİM615 Chemistry of Drugs I 3+0 7.5

Mechanisms of Drugs Effect on Biological Systems; Relationships Between the Chemical Structures of Drugs and their Biological Effects; Receptor Concept and Structure Specific Drugs; Structure Non-Specific Drugs; Solubility-Ionization Property of Drugs in Biological Systems and Its Relationship With Biological Activity; Steric Properties of Drug Molecules and its Relationship With Biological Activity; Isosterism and its Application on Biological Systems.

KİM616 Chemistry of Drugs II 3+0 7.5

General Reactions Used in Drug Syntheses; Phenylalkylamines;Phenylethylamines;Phenylpropylamines; Allgesics; Arylalkanoic Acid Derivatives; Chemotherapeutics; Sulphonamides; Sulphonamide Diuretics; Pyrazole Analgesics; Azole Antifungales; Symphatomimetics Containing Imidazoline Residue; Benzimidazoles; Pyridine Derivatives; Dihydropyridine Antihypertensives; Drugs Containing Quinoline Residue; Pyrimidine Anticancer Agents; Barbiturates; Quinolone Hypnotics; Antihistaminic and Neuroleptics Containing Phenothiazine; Dibenzazepine Antidepressants; Cyclopentanoperhydro-Phenanthrene Hormones.

KİM617 Statistical Thermodynamics 3+0 7.5

Permutations; Thermodynamic Probability; Distribution To Energy Levels of Molecules; Statistic Weight; Most Probable Distribution; Partition Functions; Statistical Correlation To Partition of Thermodynamic Functions; Work And Heat; Enthalpy And Heat Capacity; Entropy And Free Enthalpy; Mixing Entropy; Heat Capacity of Gases; Heat Capacity of Liquids; Statistical Interpretation of Equilibrium Constant; Statistical Approach For Transition State Theory.

KİM618 Molecular Imprinted Polymers and Applications 3+0 7.5

The Purpose And Basic Principles of Molecular Imprinting: Covalent bonding imprinting, Non-covalent bonding imprinting, Metal-coordination imprinting; Synthesis and Characterization of Molecular Imprinted Polymers; Application of Molecular Imprinted Polymers: Separation and preconcentration processes by solid-phase extraction, Application of molecular imprinted polymers on high performance liquid chromatography, Application of capillary electro chromatography, Application of biosensors, Application of Pharmacologic Technology: Separation and purification of chiral compounds, Improving of releasing systems; Bioimprinting: Separation and purification of bromolecules, Improving of mimic enzyme and catalytic applications; Environment Technology Applications; Recovering Valuable Chemicals

KİM619 Organic Electrochemistry 3+0 7.5

Principles and Methods of Organic Electrochemistry; Synthetic and Mechanistic Aspects of Cathode and Anode Reactions of Organic Compounds Classified by Electrophoreses; Electrochemical Classification of Heterocyclic Compounds; Natural Products; Pharmaceuticals and Coordination Compounds; Classification of Electrode Reactions by Reaction Type; Electro synthesis of Amalgams; Reagents; Acids and Bases by Indirect Methods, Present and Future of Electro synthetic Methods.

KİM620 Surface Chemistry 3+0 7.5

Colloidal Systems; Classification of Colloidal Systems; Preparation and Purification of Colloidal Systems; Kinetic Properties; The Motion of Particles in Liquid Media; Osmotic Pressure; Liquid-Gas and Liquid-Liquid Interfaces; Surface and Interfacial Tensions; Adsorption and Orientation at Interfaces; Association Colloids and Micelle Formation; The Solid-Gas Interface; Adsorption of Gases and Vapours on Solids; The Solid-Liquid Interface; Adsorption From Solution; Charged Interface; Colloid Stability; Emulsions and Foams.

KİM621 Supercritical Fluids 3+0 7.5

Definition of Supercritical Fluids; Physical Properties of Supercritical Fluids; Properties at or Near the Critical Point; Properties of the Supercritical Region; Density; Diffusivity; Viscosity; Dielectric Constant; Polarity; Physico-Chemical Properties of Pure Supercritical Solvents; Binary Systems; Reactions in Supercritical Fluids; Influence of Pressure on the Reaction Rate; Catalytic Effects; Solid-Supercritical Fluid Phase Diagrams; Thermodynamic Modeling of Supercritical Fluid-Solute Phase Behavior; Applications of Supercritical Fluids.

KİM622 Ion Selective Electrodes 3+0 7.5

Ions; Formation of Ions, Conduction of Electricity; Strong and Weak Electrolytes; Polyelectrolytes; Electrodes, Oxidation and Reduction; Electrode Potentials; Electrochemical Cells; Electrode Reactions; Electrode Types; Ion Selective Electrodes; Crystalline (Single and Polycrystal) and Noncrystalline (Glass, Liquid Etc.) Electrodes, Molecular Selective Electrodes; Gas Sensors; Enzyme Substrate Electrodes (Biosensors and Modified Electrodes), Application of Ion and Molecular Selective Electrodes.

KİM623 Affinity Chromatography 3+0 7.5

Principles for the Affinity Chromatography; Choice of the Ligand; Utility and Choice of a Spacer Arm; Choice of the Matrix; Principal Methods of Immobilization; Direct Immobilization; Indirect Immobilization; Evaluation of Reactive Groups Anchored to the Matrix; Methods for Determining the Amount of Immobilized Ligand; Experimental Procedures; Separation on Column, Separation in Suspension; Application Fields of Affinity Chromatography; Protein Separation and Purification; Nucleic Acid Separation; Cell Separation; Large Scale Application; Particular Aspects of Affinity Chromatography; Charge Transfer Chromatography; Metal Chelate Chromatography; Covalent Chromatography; Hydrophobic Chromatography; Affinity Electrophoresis.

KİM624 Solvent Extraction Chemistry 3+0 7.5

Aqueous Solutions, Organic Solutions and Liquid-Liquid Systems; Statistical Treatment of Liquid-Liquid Distribution Equilibria; Solvent Extraction Systems; Solvent Extraction of Nonelectrolyte Molecules; Weak Acid and Bases and Ionic Salts; Solvent Extraction with Acidic, Basic and Neutral Extractants; Application of Solvent Extraction in Solution Chemistry; Determination of Thermodynamic Activity of Chemical Species in Solutions; Determination of Association and Dissociation Equilibria in Solutions; Applications of Solvent Extraction in Analytical Chemistry.

KİM642 Photochemistry 3+0 7.5

Organic Photochemistry; Electronic Orbital; Configurations and State; Transitions Between States-Chemical Dynamics; Potential Energy Surfaces; Radiative Transitions; The Absorption and Emission of Light; Photo-physical Radiation Transitions; Theoretical Organic Photochemistry; Mechanistic Organic Photochemistry; Energy Transfer; Photoaddition and Photosubstitution Reactions; Cycloaddition Reactions; Isomerizations and Rearrangements; Photofragmentation Reactions.

KİM643 Named Reactions in Heterocyclic Chemistry 3+0 7.5

Three and Four Membered Heterocyclics: Corey-Chaykovsky reaction, Jacobsen-Katsuki epoxidation, Paterno-Buchi reaction; Five Membered Heterocyclics: Barton-Zard reaction, Knorr and Paal-Knorr pyrrol synthesis, Hofmann-Löffler-Freytag reaction; Fischer indole synthesis, Graebe-Ullman carbazole synthesis, Madelung indole synthesis, Reissert indole synthesis, Paal-Knorr furan synthesis, Feist-Benary furan synthesis, Fiesselmann thiophen synthesis, Paal thiophen synthesis, Fischer oxasole synthesis, Knorr pyrazole synthesis; Six Membered Heterocyclics: Krönke pyridine synthesis, Chichibabin pyridine synthesis, Camps quinoline synthesis, Doebner quinoline synthesis, Pictet-Hubert reaction, Beirut reaction, Biginelli reaction.

KİM644 Stereochemistry 3+0 7.5

Simple Molecules; Hybridization, conformation and configuration, Chirality and stereogenic centers; Chiral Molecules; One stereogenic center, Molecules with two (or more) stereogenic centers Isomerism in carbon compounds; Stereochemistry of

carbon-carbon and carbon-nitrogen bonds, Stereoisomerism in cyclic structures, Substitution reactions at saturated carbon: Fischer projections, Absolute stereochemistry: the r/s rules, Optical activity, Recognizing symmetry, Identifying chiral centers, Chirality without stereogenic carbon, Prochirality, enantiotopic and diastereotopic groups and faces: use of nmr spectroscopy in stereochemistry.

KİM645 Bioorganic Chemistry 3+0 7.5

Natural Products and Drug Research; Enzymatic Synthesis and Biotransformation; Carbohydrate Chemistry and Glycobiology; Peptide Chemistry and Applications; Biosynthetic Pathways and Biochemistry; Physical and Analytical Methods.

KİM646 Nanochemistry 3+0 7.5

Introduction: Inorganic Material Chemistry and Properties of Nanostructures; Nanomaterial Synthesis Methods: Bottom-up vs. Top-down Methods; Characterization of Nanomaterials; Nanomaterials: Inorganic Nanoclusters, Quantum-dots and Nanowires; Metal, Metal Oxide and Carbon Nanotubes; Inorganic-Organic and Inorganic-Polymer Nanocomposite Materials; Applications of Nanomaterials.

KİM647 Molecular Structure Calculations and Theories 3+0 7.5

Molecular mechanics, Hydrogen molecule ion, Potential energy surfaces, Born-Oppenheimer approximation, Linear combination of atomic orbitals, Hydrogen molecule, Valence bond theory, Electron density, Self consistent field theory, Koopman?s theorem, Open shell calculations, Unrestricted Hartree-Fock theory, Differential overlap models, Atomic orbitals and choice of atomic orbitals, Ab-initio quantum mechanical calculations, Semi-empirical quantum mechanical calculations, Electron correlation, Application to real chemical problems.

KİM648 Named Reactions in Organic Chemistry 3+0 7.5

Named Reactions of Rearrangment: Chan, Demjanov, Ferrier, Payne, Ramberg-Backlund, Stevens, Tiffeneau-Demjanov; Named Reactions of Addition: Heck, Henry; Named Reactions of Coupling: McMurry, Roush, Sonogashira, Stille, Suzuki; Named Reactions of Olefination: Horner-Wadsworth-Emmons, Nysted, Pearlman, Peterson; Named Reactions of Aldehydes and Ketons: Barbier, Luche, Parkih-Doering, Garner, Seyferth-Gilbert; Named Reactions of Condensation, Stobbe, Ugi, Pechmann, Darzens; Named Reactions of Cyclization: Bergman, Birch, Danishefsky, Glase, Majetich, Paterno-Buchi, Nazarov, Pictet-Spengler; Named Reactions of Oxydation- Reduction: Swern, Julia, Jones, Fleming-tamao, Dess Martin; Named Reactions of Amines: Neber, Shapiro.

KİM649 Organic Functional Group Preparations I 3+0 7.5

Alkanes, Alkenes, Alkynes, Alcohols, Amines, Nitroso Compounds, Nitro Compounds, Nitriles, Isonitriles (Isocyanides), Cyanates, Isocyanates, Carbonyl Compounds, Thiocyanates, Isothiocyanates, Carbonyl Compounds.

KİM650 Organic Functional Group Preparations II 3+0 7.5

Azides, Azo Compounds; Boranes, Borates, Peroxides, Thiols, Sulfides, Disulfides, Sulfoxides, Sulfones, Sulfonik Acids, Sulfonates, Organophosphorus Compounds, Phosphonic Acids, Phosphinic Acids, Phosphines, Phosphates, Phosphites.

KİM651 Biosensors 3+0 7.5

Biosensors and Their Fundamental Properties: Ideal biosensor characteristics and measurement systems, enzyme kinetics; Basic Electrochemical Principles: Cells, electrodes, current-potential curves; Transducers: pH, O2, CO2, H2O2, ion measurements; Amperometric Biosensors: Mesarument systems and applications; Potentiometric Biosensors: Types of indicator electrodes and applications; Immunosensors: Basic principles and applications; Microbial Biosensors: BOD, gas, hybrid sensors and applications; Thermal Biosensors: Enzyme activity determination, environmental applications.

KİM654 Proteomics and Genomics 3+0 7.5

The Molecular Basis of Heredity: DNA; RNA; Gene; Chromosome; Protein and Heredity; Gene Cloning; Applications of Recombinant DNA Technology; Human Genome Project and Genetic Engineering; Protein Structure; Function and Purification; Affinity Chromatography and Application of Affinity Chromatography; Gel Based Proteomics; Electrophoresis and Principles and Applications of Proteomics; Molecular Analysis and Bioinformatics.

KİM657 Asymmetric Organic Synthesis I 3+0 7.5

Stereo chemical terms; P urpose and importance of asymmetric synthesis; Analytical methods; Resolution; Asymmetric synthesis and rules; General methods used in asymmetric synthesis; Use of natural chiral compounds in asymmetric synthesis; Asymmetric synthesis using chiral auxiliary component; Chiral catalysts and use of chiral catalysts in asymmetric synthesis; Chiral compounds; Bioorganic asymmetric synthesis and use of other methods in asymmetric synthesis.

KİM658 Asymmetric Organic Synthesis II 3+0 7.5

Overview of asymmetric organic reactions; Carbon-carbon bond formation; Asymmetric carbon-heteroatom bond formation; Addiction reactions to multiple bonds; Hydrogenation; Cyclization reactions; Reduction and oxidation reactions; Rearrangement reactions; Isomerazation; Applications and industrial importance of asymmetric synthesis; Selected sample reactions in the literature for asymmetric synthesis.

KİM659 Synthesis of Amino Acids and Peptides 3+0 7.5

Sources and Roles of Amino Acids and Peptides; Nomenclature for ?The Protein Amino Acids?; Alias ?The Coded Amino Acids ; Abbreviations for Names of Amino Acids; Conformations of Amino Acids and Peptides; Physicochemical Properties of Amino Acids and Peptides; Examples of Assignments of Structures to Peptides from NMR Spectra and Other Data; Reactions and Analytical Methods for Amino Acids and Peptides; Determination of The Primary Structure of Peptides and Proteins; Synthesis of Amino Acids; Methods for The Synthesis of Peptides; Biological Roles of Amino Acids and Peptides; Some Aspects of Amino-Acid and Peptide Drug Design.

KİM665 Bioorganometallic Chemistry 3+0 7.5

Relationship Between Inorganic and Organic Chemistry; Metals and Chemistry of Metals in Biological Systems: Mn, Fe, Co and Cu, Ni metal identification techniques; Bonding Theories in Organometalic Chemistry: Valance bond, Molecular orbital and ligand field theory, Chemistry of M-C, M-N, M-S and M-O bonding; Supramolecular Ligands and Metal Complexes: Synthesis, Properties, Characterization; Biological Ligands: Metalloproteins, Carbohydrates, Sugars, Lipids; Biocatalysts and Biocatalytic Reactions; Chemistry of Enzyme: Catalase, Peroxidase, Nitrogenase enzymes; Metals in Medicine.

KİM667 Metals in Catalytic Reactions I 3+0 7.5

Concept of Catalysis: Catalysis, Catalyst, Selectivity, Activity; Catalytic Reaction Types: Homogeneous catalysis, Heterogeneous catalysis; Catalytic Reaction Mechanisms: Oxidative addition, Reductive elimination, Insertion, Elimination; Some Catalytic Reaction Types: Hydrogenation, Hydroformylation, Oxidation, Coupling; Catalytic Properties of Main Group Metals: Metal halides, Metal oxides, Phase transfer catalysts; Catalytic Properties of Transition Metals: Iron group metals, Copper group metals, Platinum group metals; Catalytic Applications of Transition Metals.

KİM669 Analytical Method Development and Validation 3+0 7.5

Statistical Evaluation of Analytical Data; Analytical Method Selection; Analytical Method Development and Validation: Introduction: Validation process, Qualification, Method development, Optimization and validation approaches: Method development, Optimization, Method validation approaches; Method Validation: Terminology and Definitions: Accuracy, Precision, Specificity, Limit of detection, Limit of quantification, Linearity and range, Ruggedness, Robustness, Data elements required for assay validation; System Suitability; Method Validation Protocol; Method Transfer and Revalidation.

KİM675 Polymer-Clay Nanocomposites 3+0 7.5

Polymers; Definition, Characteristics, Classification and synthesis methods of polymers; Clays: Definition, Structure, Characteristics and classification of clays, Cation exchange capacity, Organoclays; Nanocomposite Materials: Definition, Characteristics, Classification, Advantages and disadvantages of nanocomposite materials; Synthesis Methods and Characterization of Nanocomposite Materials; Rheological, Morphological, Thermal and mecanical properties of nanocomposite materials; Application Areas of Nanocomposite Materials; Nanocomposite Hydrogels.

KİM676 Applications of HPLC and Other Chromatographic Methods in Food Analysis 3+0 7.5

HPLC Method and Its Importance for Food Analysis; HPLC Analysis of Mycotoxins and Pesticides; HPLC Analysis of Vitamins and Phenolic Acids; HPLC Analysis of Carbohydrates and Lipids; HPLC Analysis of Protein, DNA, Peptide and Amino Acids; HPLC Analysis of Hormones, Drugs and Antibiotics; HPLC Analysis of Food Additives; Other Chromatographic Methods Used in Food Analysis: Gas chromatography, Capillary electrophoresis; Problems Encountered in HPLC Analyses, Possible Reasons and Troubleshooting; Sample Preparation Methods in Food Analysis: Liquid-liquid extraction, Solid phase extraction; HPLC Applications in Food Analysis.

KİM692 Seminar 3+0 7.5

KİM701 Physical Chemistry of Foods 3+0 7.5

Physical Chemistry in Food Science and Technology; Thermodynamics, Bondings; Interaction Forces; Reaction Kinetics; Transport Phenomena; Polymers, Proteins; Water Relations; Dispersed Systems; Surface Phenomena; Formation of Emulsions and Foams; Colloidal Interactions; Changes in Dispersity; Nucleation and Crystallization; Glass Transitions Point and Freezing Foods; Soft Solids.

KİM790 Thesis 0+1 30.0

KİM890 Thesis 0+1 30.0

KİM890-0 Thesis (Thesis Proposal) 0+1 30.0

KMH501 Advanced Chemical Engineering Thermodynamics 3+0 7.5
Basic Concepts of Thermodynamics; Properties of Pure Substances; The First Law of Thermodynamics; The Second Law of Thermodynamics; Entropy; Second-Law Analysis of Engineering Systems; Thermodynamics Relations; Gas Mixtures; Chemical Reactions; Chemical and Phase Equilibrium.

KMH505 Advanced Mass Transfer 3+0 7.5
Principles of Diffusion and Mass Transfer Between Phases; Theory of Diffusion; Mass Transfer Coefficients; Diffusion in Solids; Inter phase Mass Transfer; Gas-Liquid Operations; Gas Absorption; Distillation; Equipment for Gas-Liquid Operations; Humidification Operations; Liquid Extraction; Solid-Fluid Operations; Adsorption and Ion Exchange; Drying; Solid-Liquid Extraction.

KMH506 Advanced Process Control 3+0 7.5
Theoretical Analysis of Complex Process; Stability; Root Locus; Frequency Response Methods; Control System Design by Frequency Response; Bode and Nyquist Diagrams; Advanced Control Techniques; Cascade Control; Feed forward Control; Internal Model Control; Adaptive Control; Predictive Control; Controller Design and Tuning; State-Space Methods; Nonlinear Control; Digital Computer Simulation of Control Systems; Process Control Strategies.

KMH507 Advanced Heat Transfer 3+0 7.5
Process Heat Transfer; Conduction; Convection; Radiation; Temperature; Counter flow; Double-Pipe Exchangers; 1-2 Parallel-Counter flow; Shell-and-Tube Exchangers; Flow Arrangements for Increased Heat Recovery; Streamline Flow and Free Convection; Calculations for Process Conditions; Condensations of Single Vapors; Condensation of Mixed Vapors; Evaporation; Vaporizes; Evaporators and Reboilers; Extended Surfaces; Direct-Contact Transfer; Cooling Towers; Batch and Unsteady State Processes; Furnace Calculations; The Control of Temperature and Related Process Variables.

KMH509 Fuel and Energy 3+0 7.5
Energy; Forms of Energy; Energy Conversion; Energy Sources and Resources; Solid Fuels; The Formation of Coal; The Structure and Petrography of Coal; Sampling and Analysis of Solid Fuels; Liquid and Gaseous Fuels; Crude Petroleum; Physical Processing of Crude Petroleum; Natural Gas; Liquefied Petroleum Gases; Conversion Processes; Cracking Processes; Reforming Processes; Carbonization and Gasification Processes; Carbonization of Coal; The Gasification of Solid Fuels; Fuel Testing; Calorific Value; Tests on Liquid Fuels; Fuel and Flue Gas Analysis; Calculations in Fuel and Energy; Estimation of Fuel Properties from Experimental Data; Mass and Energy Balances; Stoichiometry; Application to Combustion Plant.

KMH510 Advanced Reactor Design 3+0 7.5
Multiple Reactions; Design for Parallel Reactions; Successive Irreversible Reactions of Different Orders; Irreversible Series-Parallel Reactions; Flow Patterns; Contacting, and Non-Ideal Flow; Basics of Non-Ideal Flow; Compartment Models; The Dispersion Model; The Tanks-In-Series Model; The Convection Model for Laminar Flow; Earliness of Mixing; Segregation and RTD; Self-Mixing of a Single Fluid; Mixing of Two Miscible Fluids.

KMH511 Advanced Instrumental Analysis 3+0 7.5
Basic Principles of Spectroscopy; UV and Visible Section Molecular Adsorption Spectroscopy; IR Spectroscopy; Nuclear Magnetic Resonance Spectroscopy; 1H-NMR, 13C-NMR; Chromatographic Analysis Methods; GC; GC-MS; Thermal Analysis Methods; TG; DTA; Application of Thermal Analysis by Spectroscopic and Chromatographic Methods in Chemical Engineering.

KMH513 Advanced Transport Phenomena 3+0 7.5
Conservation Principles; The Control Volume; Principle of Conservation of Mass; The Momentum Theorem; Principle of Conservation of Energy; The Differential Equations of the Boundary Layer; The Integral Equations of the Boundary Layer; Momentum Transfer; Heat transfer; Convective Heat Transfer at High Velocities; Mass Transfer; Formulation of a Simplified Theory; Some Solutions to the Conserved Property Equation; Some Examples of Evaluation of the Driving Force.

KMH516 Physical Operations in Food Technologies 3+0 7.5
Cleaning of Raw Materials; Dehulling; Peeling; Techniques and Equipment of Drying; Particle Size; Size Reduction; Particle Size Distribution; Particle Density; Techniques and Equipment of Classifying; Distillation; Rectification and Extraction; Filtration: Ultra Filtration; Micro Filtration; Supercritical Fluid Extraction; Principles; Applications in Food Industry; Recovering Valuable Components From By-Products.

KMH517 Advanced Stoichiometry 3+0 7.5
Definition of Selected Production Processes; Assessment of Required Physical and Chemical Data and Formula; Determinations of Mass and Energy Balances in the Process Units and their Solutions; Some Examples on Mass and Energy Balances; Balances on Transient Processes; Production of Soda Ash from Brine; The Use of Limestone Slurry Scrubbing to Remove Sulphur Dioxide from Power Plant Flue Gases.

KMH518 New and Renewable Energy Sources 3+0 7.5
Solar Energy; Hydropower; Hydrogen Energy; Geothermal Energy; Wind Energy; Biomass Energy; Biomass Formation; Biomass Characteristics; Biomass Advantages; Biomass Components; Environmental Effects of Biomass; Biomass Sources; Fuel and Chemicals Production From Biomass; Biochemical Converting Processes; Thermo Chemical Converting Processes; Application Areas of These.

KMH519 Advanced Fluid Mechanics 3+0 7.5
Viscosity and the Mechanism of Momentum Transport: Newton's law of viscosity, Pressure and temperature dependence of viscosity, Theory of viscosity of gases, Theory of viscosity of liquids; Velocity Distributions in Laminar Flow: Shell momentum balances, Flow of a falling film, Flow through a circular pipe, Flow through an annulus, Adjacent flow of two immiscible fluids; Transportation and Metering of fluids: Pipes, Fittings, Valves; Pumps: Positive-displacement pumps , Centrifugal pumps, Fans, Blowers, Compressors; Measurement of Flowing Fluids: Area meters, Turbine meters, Magnetic meters, Thermal meters, Elbow meters, Weirs.

KMH520 Chromatographic Separation Processes 3+0 7.5
Separation Principles; Dynamics of Zone Migration; Diffusion and Kinetics; Modern Analytical and Preparative Bio separation Techniques of Liquid Chromatography; Elution and Separation Techniques in Liquid Chromatography; Gradient Elution; Adsorption; Partition; Size Exclusion; Ion Chromatography and Ion Exchange; Detectors Used in Liquid Chromatography; UV-Vis; Fluorescent; Refractive Index; Conductivity and Mass Detectors; Column Packing Materials in Analytical and Preparative Scale Liquid Chromatography; Method Development and Validation in Liquid Chromatography; Applications to Food and Bioprocesses; Quantification.

KMH521 Mathematical Methods in Chemical Engineering I 3+0 7.5
Ordinary Differential Equations; Solutions by the Laplace Transform, Solutions by Series; Simultaneous Differential Equations; Functions and Definite Integrals; The Error Function; The Gamma Function; Other Tabulated Functions Defined by Integrals; Evaluation of Definite Integrals; Treatment of Experimental Results; Theoretical Properties; Curve Fitting; Propagation of Errors.

KMH523 Advandced Separations Processes 3+0 7.5
Thermodynamics of Separation Operations; Energy; Entropy; Phase Equilibria; Ideal Liquid Solution Model; Nonideal Thermodynamic Property Models; Derived Thermodynamic Properties From P-V-T Models; Liquid-Liquid; Liquid-Solid Equlibria; Solvent Extraction of Organic and Inorganic Solids; Principles; Equipment; Design Calculation Methods; Algebraic and Graphical Methods; Ideal Stage and Equilibrium; Fluid/Particle Separations; Theory and Practices; Motion of Particles in Fluids; Properties of Fine Particles; Interfacial Phenomena and Rate Equations; Membrane Processes; Supercritical Fluid Extraction; Supercritical Fluid; Principles; Phase Equilibrium; Operation; Effect of Co solvent; Applications.

KMH524 Materials' Synthesis, Characterization and Applications 3+0 7.5
Synthesis and Characterization Methods (Methods Such As XRD, AAS, SEM, AFM, EDS and XPS) and Applications of Micro-, Meso- and Macro-Porous Materials; Nano-Porous Materials and Their Industrial Applications.

KMH525 Supercritical Fluid Extraction 3+0 7.5
Fundamentals of Processing With Supercritical Fluids; Phase Equilibria; Thermodynamics; Equations of State; Critical Behavior; Crossover Effects; Properties of Supercritical Fluids; Viscosity; Thermal Conductivity; Diffusion Coefficient; Solubility in Supercritical Solvent; Extraction of Substances With Supercritical Fluids From Solid Substrates; Extraction Process; Extraction Rate; Influence of Process Parameters and the Conditions of the Solid Substrate on the Extracting Process; The Effect of Modifier on Solvent Power; Selectivity and their Pressure and Temperature Dependence; Supercritical CO2; Mass Transfer Phenomena in Supercritical CO2 for Production of Natural Substances; Industrial

Applications to Food; Pharmaceuticals; Natural Materials; Supercritical CO2 Extraction of Vegetable Oils; Process Scale-Up and Economy.

KMH526 Membrane Separation Processes 3+0 7.5

Membrane Materials; Transport in Membrane: Liquid Diffusion, Gas Diffusion, Cascades; Dialysis and Electrodialysis; Membrane Structure: Reverse Osmosis Membranes, Microfiltration Membranes, Ultra Filtration Membranes; Pervaporation; Gas Permeation.

KMH527 Electrochemical Engineering 3+0 7.5

Vector Calculus; Dilute Solution Theory; Cell Potential; Effect of Convection in Mass Transfer; Estimation of Mass Transfer Rates from Nu Correlations; Potential and Current Distribution Problems; Secondary Distribution Problems; Numerical Calculation of Potential Distribution; Reactor Design in Electrochemistry; Differential Mass Balance; Convective Diffusion Problems; Concentrated Solution Theory; Electrode Kinetics: Measurement and Interpretation; Solid State Membrane Reactors; Measurement of Diffusion Coefficient; Impedance Modeling and Data Interpretation; Modeling and Design of Polymer Electrolyte Membrane Fuel Cell.

KMH528 Fuel Cells 3+0 7.5

Principles of Fuel Cells; Efficiency and Open Circuit Voltage; Operational Fuel Cell Voltages; Polymer Electrolyte Membrane Fuel Cells; Alkaline Electrolyte Fuel Cells; Medium and High Temperature Fuel Cells; Fuelling Fuel Cells; Auxiliary Units with Fuel Cells; Delivery of Fuel Cell Power.

KMH529 Numerical Methods in Chemical Engineering I 3+0 7.5

Thermodynamics; Establishment of Non-linear Equation and Equation Systems Frequently Encountered in Thermodynamics; Unit Operations and Chemical Kinetics; Numerical Methods for Solving These Equations; Numerical integration; Simpson Rule; Method of Successive Substitutions; Newton Method; Jacobi Method; Gauss-Jordan Method; Development of Computer Models.

KMH530 Design of Experiments in Chemical Engineering 3+0 7.5

Design of Experiments and the Taguchi Approach; Definition and Measurement of Quality; Common Experiments and Methods of Analysis; Experimental Design Using Orthogonal Arrays; Experimental Design with Two-Level Factors; Experimental Design with Three- and Four-Level Factors; Analysis of Variance; Experimental Design for Studying Factor Interaction; Experimental Design with Mixed-Level Factors; Combination Designs; Strategies for Robust Design; Analysis Using Signal-to-Noise Ratios; Result Comprising Multiple Criteria of Evaluations; Quantification of Variation Reduction and Performance Improvement; Effective Experiment Preparation and Planning.

KMH531 Bioseparation Engineering 3+0 7.5

Introduction to Bioproducts: Primary and secondary metabolites; Proteins: Structure and stability; Biosystems: Eukaryotic and prokaryotic cell structure and cultivation; Cell Disruption Methods and Flocculation; Crystallization and Precipitation; Membrane Filtration; Extraction: Organic aqueous, Aqua two-phase, Reverse micelles, Supercritical fluids; Chromatography; Electrophoresis; Solvent Removal and Drying; Bioprocess Design.

KMH532 Biochemical Engineering 3+0 7.5

Bioprocessing; Enzyme Kinetics: Simple enzyme kinetics, Enzyme reactors, Enzyme inhibition; Cell Cultivations: Microbial, animal and plant cell cultivations; Cell Kinetics and Fermenter Design: Batch and continuous fermentation processes, Plug flow, Continuous stirred-tank fermenter, Multiple fermenters in series, Kinetic models; Sterilization; Agitation and Aeration: Basic mass transfer concepts; Measurements of Interfacial Area, Oxygen absorption rate, Scale-up; Downstream Processing: Solid-liquid separation, Recovery and purification processes.

KMH533 Polymer Synthesis 3+0 7.5

Concept of Polymer; Structure and Nomenclature of Polymers; Types of Molecular Weight in Polymers and Molecular Weight Determination Methods; Synthesis of Polymers: Step-growth polymerization, Condensation polymerization, Cationic polymerization, Anionic polymerization; Polymerization Techniques: Bulk polymerization, Solution polymerization, Suspension polymerization, Emulsion polymerization, Interfacial polymerization.

KMH534 New Carbon Materials 3+0 7.5

Carbon Materials: The element carbon, Carbon family, Characterization of carbon materials; Graphite: Natural graphite, Synthetic graphite; Isotropic Carbons: High density isotropic graphites, Glassy carbons; Carbon Fiber: Classification of carbon fibers, Production, Properties, Applications; Porous Carbons; Pore Formation and Characterization, Carbon foam, Activated carbon; Carbon Composites.

KMH535 Porous Materials 3+0 7.5

Definition and Classification of Porous Materials; Natural and synthetic porous materials, Synthesis methods for synthetic porous materials, Characterization methods; Using Porous Materials in Catalysis: As supporting materials and as catalysts; Determination of Internal and External Mass Transfer Mechanisms and Transport Parameters in Porous Materials; Internal and External Mass Transfer Effects on Selectivity in Reactions.

KMH536 Advanced Concrete Admixtures 3+0 7.5

Composition and Production of Cement; Properties of Concrete Making Materials; Properties of Fresh Concrete; Properties of Hardened Concrete; Mineral Admixtures; Classification of Chemical Admixtures Used in Concrete Production; Concrete Mixing Water; Compatibility of Cement and Chemical Admixtures; Plasticizing Admixtrues; Set Retarding and Accelerating Admixtures; Air Entraining Admixtures; Water Proofing Admixtures; Anti-Corrosion Admixtures; Biological Admixtures

KMH537 Hydrogen Production from Biomass 3+0 7.5

Concepts of Biomass; Gasification: Thermal, Oxidation, Miscellaneous gasification processes; Biomass-Derived Synthesis Gas Conversion; Supercritical Conversion; Pyrolysis: Production of hydrogen, carbon and methanol; Biological Conversion of Biomass to Hydrogen; Production of Storable Intermediates from Biomass Partial Conversion: Hydrogen from biomass-derived pyrolysis oils, Hydrogen from biomass-derived methanol; Techno-economic and Life Cycle Analysis of the Conversion of Biomass to Hydrogen: Techno-economic assessments, Life cycle analysis; Overview of Hydrogen Production Pathways.

KMH538 Geopolymers 3+0 7.5

Definition of Geopolymers; Geopolymerisation; Geopolymerisation Mechanism; Stuctures of Geopolymers; Raw Materials for Geopolymer Production; Parameters Affecting Geopolymerisation; Mechanical Properties of Geopolymers; Microstructural Properties of Geopolymers; Applications of Geopolymers: Geopolymer Cement, Geopolymer Concrete; Innovative Applications of Geopolymers.371

KMH539 (Eng) Materials and Fire 3+0 7.5

Fire hazards and safety; Thermal decomposition of polymeric materials; Thermal analysis; Polymer combustion; Mechanisms of flame retardancy; Flame retardant materials; Fire tests and parameters assesed; Heat release rate and calorimetry; Smoke, smoke measurement, smoke density; Multicomponent flame retardant systems and their applications; Intumescent flame retardant systems and their applications; Nanocomposite based flame retardant systems and their applications; Flame retardancy of textiles; Applications for flame retardants (building and construction, transportation etc)

KMH540 Pharmaceutical Manufacturing Technologies 3+0 7.5

Introduction to drug technology, Liquid and solid drug production methods, Controlled drug delivery, Materials for drug delivery, Drug development technologies, Quality control methods in drug production, Process development and Pilot facilities, Process development for biotechnological drugs.

KMH592 Seminar 3+0 7.5

KMH601 Stage Separation Processes I 3+0 7.5

The Staged Process; The Ideal stage; The Staged Separation; Batch and Continuous Processes; Steady-State and Unsteady-State Operation; Equilibrium and Non equilibrium Separations; Distillation; Liquid-Liquid Extraction; The Overall Material Balance; Flow Variables; Phase Flows, Recycle Matrices; Calculation of Flows; The Component Material Balance; Definitions of Phase Compositions; The Sum of Compositions Restrictions; Phase Equilibrium; The Equilibrium Ratio; Equilibrium Equations; Equilibrium Ratio Equations for Some Simple Cases; Computer Programs for Equilibrium Ratios.

KMH602 Stage Separation Processes II 3+0 7.5

Constant Equilibrium Ratio Extraction; The Equilibrium Ratio in Liquid Extraction; Equations for Constant Equilibrium Ratio Extractions; Basic Program for Constant Equilibrium Ratio Extractions; Iterative Methods for Simultaneous Vector Equations; Constant Flow Rate Distillation: a Fixed Flow Model; Distillation Terminology; Bubble and Dew Point Calculation; Bubble Point Correction Method for Constant Flow Distillation; Constant Flow Distillation With Nonideal Liquid Phases; The Fugacity Ratio; Isotropic and Extractive Distillation; Energy Balance Equations; Derivation of the Energy Balance Equations; Calculation of Enthalpy for Vapor and Liquid Mixtures; A Computer Program for Calculation of Enthalpy.

KMH604 Petroleum Refinery Engineering 3+0 7.5

History and Development of Refining; Composition of Petroleum; Refinery Products and Test Methods; Evaluation of Oil Stocks; Physical Properties of Petroleum Oil; Introduction to Processing; Refinery and Distillation Processes; Refinery Corrosion and Metals; Chemical Treatments; Solvent Treating or Extraction Processes; Fluid Mechanics; Vaporization and Condensation; Fractionation and Towers; Heat Transfer and Exchangers; Tubestill Heaters; Thermal Cracking and Decomposition Processes; Rebuilding Hydrocarbons; Catalytic Cracking and Reforming; Natural and Refinery Gases; Economics of Design; Typical Design Calculation.

KMH605 Heterogeneous Reaction Kinetics and Reactor Design 3+0 7.5

Global Rates of Reactions in Heterogeneous Processes; Fluid-Particle Reaction Kinetics; Fluid-Particle Reactor Design; Fluid-Fluid Reactions Kinetics; Fluid-Fluid Reactor Design; Solid Catalyzed Reactions; Rates of Adsorption; Desorption and Surface Reaction; Rate Equations in Terms of Fluid Phase Concentrations; Kinetics of Catalyst Deactivation.

KMH606 Advanced Mathematical Modeling in Chemical Engineering 3+0 7.5

Energy and Mass Balances in Steady-State Systems; Modeling in Unsteady-State Systems with a Single Variable; Modeling in Unsteady-State Systems with Multiple Variables; Modeling of Systems Involving Chemical Reactions; Solution of Finite Difference Equations.

KMH609 Synthetic Fuel Production By Thermochemical Methods 3+0 7.5

Fossil Fuels; Synthetic Fuels; Chemistry of Synthetic Fuels; Thermodynamics of Synthetic Fuels; Reaction Kinetics and Catalysis; Biomass; Biomass Sources, Thermochemical Methods; Pyrolysis: Mass and Energy Balances; Reactor Description; Effective Factors; Liquefaction: Indirect and Direct Liquefaction; Gasification; Oxygen Production; Hydrogen Production; Combustion.

KMH611 Advanced Carbon Materials from Biomass 3+0 7.5

Biomass Feedstocks: The main constituents of biomass, Characterization; Modelling the Thermochemical Conversion of Biomass: Heat and Mass transfer, Kinetics and thermodynamics; Thermochemical Conversion Technologies: Torrefaction, Pyrolysis, Gasification; Industrial Pyrolysis Technologies; Hydrothermal Carbonization and its Role in Catalysis; Green Carbons; Biocarbon as Adsorbents: Liquid and gas phase adsorption processes; Biocarbons for Gas Storage; Biocarbons for Energy Storage; Sustainability of Biocarbon Production and Application.

KMH613 Coal Technology 3+0 7.5

Coal Beneficiation-History, Current Options And Effectiveness; Physical Coal Cleaning Systems; Coal Pre-Treatment-Size Reduction and Screening Techniques; Dry Mechanical Separation Processes; Wet Mechanical Separation Processes; Chemical Coal Cleaning; Coal Combustion; Fluidized Bed Combustion; Coal Briquette; Coal Pyrolysis; Coal Gasification; Coal Liquefaction.

KMH615 Principles and Applications of Biocatalysis 3+0 7.5

Introduction to Biocatalysis; Characterization of Biocatalysts; Isolation and Preparation of Microorganisms; Enzyme Reaction Engineering; Applications of Enzymes as Actives: Detergents, Textiles, Pulp and Paper, Animal Feed; Application of Enzymes as Catalysts: Basic Chemicals, Fine Chemicals, Food, Crop Protection, Bulk Pharmaceuticals; Biotechnological Processing Steps for Enzyme Manufacture; Biocatalysis in Non-conventional Media; Pharmaceutical Applications of Biocatalysis; Artificial Enzymes.

KMH622 Mathematical Methods in Chemical Engineering II 3+0 7.5

Partial Differential Equations; Boundary Conditions; Particular Solution of Partial Differential Equations; Method of Separation of Variables; One- and Two-Dimensional Heat Equations; Finite Differences; The Difference Operators ? and E; Linear Finite Difference Equations; Non-Linear Finite Difference Equations; Graphical Solutions.

KMH630 Numerical Methods in Chemical Engineering II 3+0 7.5

Numerical Methods; Gauss Seidel Method; Solving Nonlinear Equations; Iterations of Newton-Raphson Model; Solving Ordinary Differential Equations; Euler's Method; Runge-Kutta Method; Solving These Equations With Computer Programs.

KMH692 Seminar 3+0 7.5

KMH790 Thesis 0+1 30.0

KMH890 Thesis 0+1 30.0

KMH890-0 Thesis (Thesis Proposal) 0+1 30.0

KOR504 Architectural History and Concepts 3+0 7.5
Architecture and culture; Architecture and society; Architecture and city; Architecture and art; Architecture and form; Architecture and technology.

KOR506 Technics of Documentation 3+0 7.5
Traditional Techniques of Architectural Documentation; Latest Techniques of Documentation; Use of Information Technology for Documentation; Formation of Archives.

KOR517 History of Modern Turkish Architecture 3+0 7.5
Turkish Architecture in the Pre-Republic Period under the Effect of Western Architecture; the First Nationalistic Architecture Period; the First Period of Modern Architecture I; Period of Foreign Architects; the First Period of Modern Architecture II; Period of Turkish Architects; the Second Nationalistic Architecture Period; Architecture of Sedad Hakkı Eldem; The Period between 1950 and 1980 I; the Second Period of Modern Architecture; The Period between 1950 and 1980 II; Importance of 1960s and its Reflections on Architecture; The Period between 1950 and 1980 III; Architecture of 1970s; Architecture after 1980 I; Architecture after 1980 II; Architecture of Today.

KOR518 History of Anatolian Architecture 3+0 7.5
Historical Continuity and Interaction in Anatolia; Anatolian Civilizations: Prehistoric Period; Anatolian Civilizations 1; Anatolian Civilizations 2; Greek Architecture in Anatolia; Roman Architecture in Anatolia; Byzantine Period and Architecture; Seljuk Period and Architecture; Architecture of Principalities Period; Early Ottoman Architecture, Classical Period Ottoman Architecture and Late Ottoman Architecture.

KOR519 Construction Techniques and Conservation Problems of Ottoman Architecture 3+0 7.5
Building Types in Ottoman Architecture; Architectural Development; Different Building Types and Typological Features: Regional characteristics, Construction techniques and materials; Analysis of Structure and Building Elements; Discussion and Evaluation of Additions from Different Periods and Restitution Problems: Methods and applications; Challenges Related to Preservation of Original Construction Techniques: Techniques, Applications, Issue of re-usage; Architectural and Typological Characteristics of Historical Buildings; Adaptation of Historical Buildings into Modern Life.

KOR520 The Management of Cultural Heritage 3+0 7.5
Definition of Cultural Heritage; Principles of International Conservation Laws; International Conservation Regulations and Their Reflections on the Conservation Principles of National Conservation Laws; The Organizations about Conservation in Turkey; The Legal Framework of Conservation in Turkey and the Latest Law of Conservation; Risk Factors in the Conservation Process, Organization and Principles of Conservation Site Management.

KOR521 World Heritage Sites in Turkey 3+0 7.5
Cultural Heritage and World Heritage; Management of World Heritage Sites; Archaeological and Historical Sites; Related Legislation, Protection Policies and Approaches; Protection of Cultural Heritage in International and National Law; International Organizations and Conventions; Sustainability of Cultural Heritage; Monitoring of World Heritage Sites; World Heritage Sites in Turkey: Cultural heritage management, Determining and analyzing the current status, Needs, and Related issues; Protection Techniques and Methods; Approaches Specific to Different Countries/Cultures; Examples of World Heritage Sites.

KOR522 Housing During Republic Period 3+0 7.5
Historical References of Traditional Turkish House; Space Organization and Regional Effects on Traditional Turkish House; Effects of Ottoman Westernization on Housing; Modernity in the Early Republic Period and its Effects on Housing; Housing during the World War II; Integration to International System and Housing; Mass Housing between 1923-1960; Housing in Pluralist Period; Searches for Solution to Housing Problem; Housing During Post-Modern Period; Reflection of Architectural Styles and Approaches on Housing Design; Student Presentations I; Student Presentations II.

KOR523 Conservation Project I 2+2 7.5
Determination of Historical, Architectural and Structural Properties of one or some of the Civil, Monumental and Concrete Examples of Cultural Architectural Legacy from Different Historical Periods; Determination of the Conservation Approach

and Principles that Lead the Practice in the Same Building(s); Documentation and Historical Research; Formation of Conservation Decisions; Identification of Conservation Methods and Techniques; Proposal for the Conservation Practice.

KOR524 Conservation Project II 2+2 7.5

Documentation of th Current Situation of the Historical Settlements from Different Historical Periods, and Conducting Historical Research; Analysis of Historical, Architectural and Structural Properties of a Historical Settlement; Determination of the Conservation Approach and Principles that Lead the Practice in the Same Area; Formation of Conservation Decisions; Identification of Conservation Methods and Techniques; Proposal for the Conservation Practice.

KOR525 Conservation History and Theories 3+0 7.5

Historical Development of Conservation Problem; Conservation Approaches in the 19th Century; Relationship between Modernism and Conservation; Discussion on History, Memory and Identity, and Conservation Problem; Definition of Cultural Heritage; Conflict between Universality and Local Values; Concept and Approaches of Conservation in the Contemporary World; International Charters and Councils; National Conservation History and Theories, National Legislation for Conservation.

KOR527 Research and Documentation Methods in Protection 3+0 7.5

Introducing and Teaching the Researches, Resources and Methods to Identify Values and Phases of the Historical Structure and Environment in the Preparation Process of Restoration and Conservation Projects; Historical (Religious Courts and Kadi Registers, Charitable Foundation Documents, Decrees, Engravings, Miniatures, Historical Maps, Photographs, etc.), Written and Visual Sources and the Transmission of Usage Possibilities in this Area; Investigation of the Latest Techniques Used in the Documentation of Cultural Assets; Examining the Possibilities of Using Communication Technologies in Documentation; Creation of Archive as a Permanent Information Bank.

KOR528 Conservation of Modern Cultural Heritage 3+0 7.5

History of Conservation of Modern Architectural Heritage; Conservation Problems; Typologies and Ideologies; Materiality and Authenticity; Interior Spaces, Furnishing and Color; Conservation of Industrial Heritage; Conservation of Modern Public Premises; Conservation of Public Buildings; Modern Residences; Stakeholders of Modern Cultural Heritage Conservation and Their Participation in Conservation Processes; Case Studies from Turkey and abroad.

KOR530 Cultural Heritage Buildings and Their Adaptations to Contemporary Museum Function 3+0 7.5

Conceptual Change of Museum and Its Definiton in the Historical Process: Current Expansions of Museology Science; Design Input for the Museum Space; the Concept of Contemporary Museum and its Relations with Cultural Heritage: The Concepts of Tangible and Intangible Cultural Heritage and Their Effects to Museum Space Design; The Diversity of Interventions for Adaptations of Cultural Heritage Buildings to Contemporary Museum Function; Interventions for Functional Expansions and Changes; Analyses of National and International.Samples.

KOR531 Typological Readings in Conservation 3+0 7.5

Terminological Approach to the Concept of Typology; Understanding the Place and Importance of Typology in Conservation; Determining Data Groups of Historical Structures by means of Various Data Sources; Analysis of the Collected Data with Various Data Evaluation Methods; Arranging the Typology Titles by Evaluating the Groups Formed through Analyses; Forming Typology; Matching the Concepts of Conservation And Restitution (Plan and Facade Setup, Materials, Bearing and Architectural Elements, and Urban Morphology) with Typological Readings; Sharing and Presentation of Readings about Typology.

KOR534 SpecialTopics in Preservation 3+0 7.5

Contemporary Approaches to Conservation; International Trends in Conservation; National Trends in Conservation; the World Heritage List and Its Criteria; Discussing the Reasons for Conservation of Cultural Heritage; Environmental Effects on Historic Buildings; Sustainable Conservation.

KOR535 Special Topics in Conservation 3+0 7.5

International Trends in Conservation; National Trends in Conservation; the World Heritage List and its Criteria; Discussing the Reasons for Conservation of Cultural Heritage; Effects of Environmental Problems on the Historical Buildings; Concept of Sustainable Conservation; Effects of Tourism on Cultural Heritage; Scope of Conservation in Contemporary World, Sustainable Cultural Tourism and Conservation; Conservation Area Management; the Concept of Protected Area, and Conservation.

KOR536 Preservation Management 3+0 7.5

National Regulations for Conservation; International and National Principals, Regulations and Directives; Conservation Organizations in Turkey; Legal Framework on Conservation in Turkey and the Latest Preservation Law; Risk Factors in the Conservation Process.

KOR539 Construction Techniques and Conservation Problems of Ottoman Architecture 3+0 4.5

Building Types in Ottoman Architecture; Periods and Regional Features; Different Building Types and Typological Features: Construction Techniques and Materials; The Analysis of Structure and Building Elements; The Discussion and Evaluation of Additions from Different Periods and Restitution Problems; The Problems About Conservation of Authentic Construction Techniques: Methods and Applications; Change of Function and Issues of Re-Usage; Examples of Adaptations of Historic Buildings for Modern Use.

KOR541 History of Anatolian Architecture 3+0 4.5

Historical Continuity and Interaction in Anatolia; Anatolian Civilizations: Prehistoric Period; Anatolian Civilizations: Hittite, Phrygian, Lydian, Urartian Civilisations; Anatolian Civilizations: Greek Architecture in Anatolia; Roman Architecture in Anatolia; Byzantine Period and Architecture; Seljuk Period and Architecture; Architecture of Principalities Period; Early Ottoman Architecture; Classical Period Ottoman Architecture I; Classical Period Ottoman Architecture II; Late Ottoman Architecture.

KOR543 World Heritage Sites in Turkey 3+0 7.5

Cultural Heritage and World Heritage; Management of World Heritage Sites, Archaeological and historic sites; Legislation, Conservation policies, Approaches; International and National Law of Cultural Heritage; International Organizations and Conventions; Sustainability of Cultural Heritage; Monitoring World Heritage Sites; World Heritage Sites in Turkey: Site management, Current status, Conservation problems, Needs; Introduction of Various Techniques and Methods; Specific Approaches of Different Countries/Cultures; Examples of World Heritage Sites.

KOR545 Cultural Heritage And Accessibility 3+0 7.5

Cultural Heritage and Basic Conservation Principles: Concepts, Definitions; Legislative Context; Accessibility; Determining Reasonableness; Cultural Heritage and Access Improvements: The access strategy, The conservation assesment, The acces audit, Access options, The access action plan, Maintenance-monitoring and review, Approaches to improving access; Improving Accessibiity in the Exernal Environment; Improving Accessibility in and around Buildings; Providing Accessible Information; Cultural Heritage Improvement Practice.

KOR610 Conservation of Rural Architectural Heritage 3+0 7.5

Rural Architecture; Rural Architecture in Anatolia; Formation of the Physical Texture: Rural Landscape, Settlement and plan features;, Building types and Production Relations; Techniques Related to Documenting the Features of Rural Architecture; Analysis of Deterioration at Rural Areas; Conservation and Regeneration of the Rural Areas: Conservation Approaches for Rural Architecture Samples; International Policies for Rural Legacy; Framework for National Solutions; Rural Settlements in the Urban Context; Rural Architecture in the 21st Century.

KOR611 Accessibility of Historic Places and Buildings 3+0 7.5

Historic Places and Buildings Principles: Principles of design, Principles of conservation, Responsibilities; Legislative Context; Improving the Accessibility: Developing an access strategy, Access audit, Access options, The access action plan; Accessibility of the External Environment: Accessible routes, Urban furniture and lighting, Landscape; In and Around Buildings Accessibility: Car parking, Building routes, Entry, Circulation, Emergency evacuation; Providing Accessible Information.

KOR612 Cultural Landscapes 3+0 7.5

Definition of Cultural Landscape Concept and Its History; Tangible and Intangible Qualities of Cultural Landscapes; Conservation Approaches for Cultural Landscapes; Management Problems; Cultural Landscapes and Site Management in the scope of UNESCO World Heritage; Natural Landscape; Artificial Landscape; Historical Urban Landscape; Conservation of Cultural Landscapes in International Legal Framework; Landscape Conservation in National Legal Framework; Methodology of Integrated Conservation of Natural and Cultural Heritage; Management, Interpretation and Presentation of Cultural Landscapes; Monitoring; Stakeholders and Participation; Case Studies from Turkey/abroad.

KOR613 New Touches to The Historical Texture 3+0 7.5

Defining Historical Texture and Protection of Cultural Assets Necessary the Concept in the Light of National and International Opinion; Evaluating the Meeting With the Historic Surroundings of the New Concept; Discussing New Interventions in Historic Surroundings; Discussing New Interventions in Historic Building; Investigating New Historic Texture Touches on Various Samples Examined.

KOR614 Typological Readings in the Historical Environment 3+0 7.5

Terminological Approach to the Concept of Typology; Understanding the Place and Importance of Typology in Conservation; Determining the Data Sets of Historical Structures by the Use of Different Data Sources; Analysis of the

Collected Data with a Variety of Data Evaluation Methods; Arranging the Typology Titles by Evaluating the Groups that Emerged according to the Analyses; Forming Typology; Making the Typological Readings Compatible with the Concepts of Conservation and Restitution (Plans and Facade Arrangement, Materials, Transporter and architectural elements and urban morphology); Sharing and Presentation of Typology Based Reading.

KOR615 Tangible and Intangible Cultural Heritage 3+0 7.5

Definition of Tangible and Intangible Cultural Qualities; The Concepts of Tangible and Intangible Cultural Heritage; Tangible and Intangible Heritage in the Scope of Integrated Conservation Methodology; ‘Spirit of Place' and Tangible and Intangible Heritage; Integrated Interpretation and Presentation of Tangible and Intangible Cultural Heritage in International Documents; UNESCO World Intangible Cultural Heritage Lists; World Heritage and its Tangible and Intangible Cultural Qualities; Intangible Cultural Heritage in Turkey; Cultural Significance; Values and Narratives, Integrated Interpretation and Presentation of Tangible and Intangible Heritage.

KOR616 Cultural Heritage and Tourism 3+0 7.5

Cultural Heritage Term: Definition of cultural heritage, Examples from the world and Turkey’s wealthies of cultural heritage; Conservation of Cultural Heritage: Value of cultural heritage, Consciousness raising about transferring to future generations; Cultural Heritage Management: Bringing of researcing and documentation techniques about cultural heritage, Analysing of contemporary conservation politics about of cultural heritage; Cultural Heritage Tourism: Evaulation at social, economic and cultural points of cultural heritage for tourism, Analyzing the using of cultural heritage in building, urban and zonal scales at national and international areas.

KOR617 Cultural Herıtage Consciousness, Awareness and Partıcıpatory Approaches 3+0 7.5

What’s the cultural heritage?: Concepts of tangible and intangible cultural heritages, UNESCO World Heritage; Awareness of Cultural Heritage: Comprehending of value of cultural heritage, Awareness of being part of these vaules, Conservation problems; Cultural Heritage Management and Sustainability: Cultural heritage field management’s plans and applications, National and international legal and executive formats of awareness, Determining of partners for awareness work, Creating cultural heritage awareness on partners, Improving different work methods for partners’ categories , Encouragement the participants and providing sustainability at awareness work.

KRY501 Introduction to Urban Risk Management 3+0 7.5

Introduction to : Overview & Perspectives of Urban Risk Management;, Hazard, Vulnerability & risks: A Conceptual Approaches to Disaster Management: Definitions, Role and responsibilities; Identifying Risks & Vulnerabilities in the Urbanization; Urban Disaster Risks: Vulnerability Analyses in Urbanization, Risk assessment and mitigation strategies; Perspectives & Approaches & TypesUrban disaster risks; Turkey's Urban Risks: Past and future impactsImpact for Present and Future, Lessons lLearned from past disasters; Environmental Impacts of Urban Risk sImpacts; Earthquake Risks: Managing structural and non-structural risks, Mitigation Framework for Structural Safety and Non-Structural Mitigation Measures, GIS and Remote Sensing forin Managing Urban Risks.; Action Planning & Strategies For Urban Disater Risk Reduction.

KRY502 Emergency and Disaster Regulations 3+0 7.5

An Overview of Emergency and Disaster Management An Overview of LegislationRegulations; Importance and Necessity of Knowing Legislationthe Regulations; Act no 7269 "Some Important Laws and Implementing Regulations Related to Measures Could to BBe Taken in Case of Disasters Affecting General Public Life and Supports"; Act no 5902 "Some Important Laws and Implementing Regulations Related to Organization and Duties of Disaster and Emergency Management Presidency"; Act no 7126 "Some Important Laws and Implementing Regulations Related to Civil Defence Act"; Disaster and Emergency Councils; Duties and Responsibilities of the Provincial Disaster and Emergency Management.

KRY503 GIS and RS in Risk Management 3+0 7.5

Fundamentals of GIS and RS: Definition and components of; CBS and RS components; GIS Data Features; Satellite Image Characteristics; RS and GIS Integration: Information Extraction fFrom Satellite Iİmages; Managing Data wWith GIS; Relationship betweenWith the Risk Management and GIS and RS; Pre-Disaster Risk Analysis: Disaster hazard analysis; Elements of Risk and Vulnerability Analysis; Types and Methods of Risk Analysis; Risk Assessment; Cost-Benefit Analysis Methods; GIS and RS Application Examples at the Risk Management: Landslide risk analysis, Flood risk analysis, Earthquake risk analysis, Risk analysis of forest fire.

KRY504 Microzonation for Municipalities 3+0 7.5

Definitions and General Methodology; Seismic Microbzonation; Data Acquisition and Establishing a Database; Data Processing for Spatial Analaysis; Geographic Information System: Creating infrastructure for seismic microzonation by via geographical information systems (GIS), Evaluation and completion of the data, Mapping of raw data; Derivation and

Creation of Microzonation Maps; Land Use Management; Application of the Seismic Microzonation Maps to Urban Master Planning.

KRY505 Map Information and GIS 3+0 7.5

Introduction to Map Information: Map and map types; Scale; Specifications in Maps; Utilization from Maps: Distance and area calculations; Slope and Profile Calculations; Map Projections and Coordinates Systems: Shape of earth; Datum and geoid; Projection Types and Specifications; Geographic and Cartesian Coordinate Systems; Sheet Segmentation; Fundamentals of Geographic Information Systems (GIS): Concepts of data, Geographic data, ilnformation and information systems; Definition of GIS; History of GIS; Components of GIS; GIS Data Types and Models: Attributes and spatial data; Raster and Vector Data Models; Topology Concepts and its Rules; Application Area of GIS.

KRY506 Flood and Drought Hydrology 3+0 7.5

The Concept of Flood; Factors Affecting Flood; Precipitation and Flow Relations: Flow, Hydrograph analysis; Flood Estimation Techniques: Methods for small scale basins, Unit Hydrograph; Flood Management; The Concept of Drought: Analysis for Low flow conditions: Formation of low flow, Recession curve; Analysis of dry periods:, Definition of drought, Causes of drought, Critic drought period, Local Drought Analysis; Drought Management: Methods for increasing water volume, Methods of decreasing water demand, Methods for decreasing the impact of the drought.

KRY507 Risk Evaluation During Urban Renewal Process 3+0 7.5

Demolition Approaches: Evaluation of the approaches, Intervention principles, Demolition activities in sStructural renovation in the demolition activities; , Planning and managing projects: Key considerations whenaspects on planning demolition projects, Planning and managing for site work, Management and planning tools, Structural hazards: Identification of structural form and features;, Structural condition, Health and safety of persons the people on or off site: Risk assessmentk-based approach, Site security, Noise and vibration, Falling and projected materials;, Demolition techniques: Waste Control, Moving and Recycling Materials: Materials handling and processing: The Rremoval of demolition debris, Recycling techniques and mobile systems for recyclingMobile power plants for recycling of materials.

KRY508 Environmental Geology and Hydrogeology 3+0 7.5

Introduction:, Earth Processes; Geologic Hazards:; An overview of the damages within the scope of environmental geology; Earthquakes: Formation Processes of Earthquakes, Source of the force causing an earthquake; Volcanoes; Meteor Impacts; Floods; Coastal Processese; Slope Failures,; Soils; Surface Wwater Hydrology; Groundwater Hydrology; Resourcses and Reserves:; Mineral Resources; Energy Resourses; Military Impacts of Wars on the Environment; Environmental Law and Environmental Impact.

KRY509 Risk Determination of Underground Structures 3+0 7.5

Definitions of Concepts: Underground structures and engineering, Sustainability, Hazard and risk; Factors Affecting Underground Development: Engineering the undergroundUnderground engineering for sustainable urban development; Health and Safety in Underground Structures: Human factor effects for health and safety, Managing safety through regulation; Lifecycle Sustainability, Costs, and benefits of underground infrastructure development: Lifecycle sustainability assessment, Lifecycle Eeconomic bene?ts and costs of lifecycle; Innovative Underground Technology and Engineering for Sustainable Development: Evolution of technology, Technologies for underground site characterization.

KRY510 Global Climate Change and Meteorological Disasters 3+0 7.5

Climate; Climate System; Global Climate Change; Observed and Expected Changes in Climate in the World and in Turkey of Climate Change; Natural Disasters; Meteorological Disasters; Causes and Types; Temporal and Spatial Distribution of Meteorological Disasters; Hot Air Waves; Drought and Desertification; Floods and Overflows; Hurricanes; Strong Winds and Storms; Forest Fires; Agricultural Bugs; Early Warning Systems.

KRY511 GIS Use in Resource Inventory and Analyses 3+0 7.5

Definitions aAbout Environment; Types and Elements Components of Environment: Physical environment, Natural environment, Cultural environment; Resource and Types of Resources; Resource Inventory; Resource Analyses; Efficient Management of Resources: Global environmental problems, Global climate change, Sustainable development; Resource Analysis; Use of Geomatic Technologies in Resource Inventory and Analyses: Remote sensing, Geodesy, Geographical information technologies.

KRY512 Urban Transformation Law 3+0 7.5

An Outline of Urban Transformation: Historical development, Objectives, Definition, Models of urban transformation; Regulations: Legislation, Rationale, Concepts; Urban Transformation Aimed for Disasters: Topics, Authority, Land acquisition, Demolition, supports to rights holders, Appeals and litigation; Urban Transformation Aimed for Improvement of City: Related laws, AimObjective, Subject, Scope, Authority, Process, History of the City; Urban Transformation Aimed for Protection of History the Cultural and Natural Heritage of the City:, Nature and Cultural Heritage: Realted laws, Objectives, Subject, Scope, Authority, Construction process; General Evaluation.

KRY513 Advanced Technologies in Disaster and Emergency Management 3+0 7.5

Natural and Technological Hazards and Risk Assessment;, The Useing of Informatic and Communication Technologiesy in Disasters; Introduction to Advanced Technologiesy in Emergency Management; Disaster Communications and Connectivity Connection Networking; Disaster and Emergency Management and the İlnternet; Video Communications; Introduction to Geographical Information Systems (GIS): GIS Technology for disasters and emergency management; Operational Problems and Technology; Turkey's National Disaster Response Plan; The Disaster Management and Decision Support System.

KRY514 Disaster Law 3+0 7.5

An Outline of Disaster law: Law and its sources, Regulations, Rationale, Concsepts; Scope of Disaster Law: Measures to be taken, Supports, Insurance; An Outline of Urban Transformation Law: Historical development, Objectives, Definition, Models of urban transformation, Urban transformation aimed for disasters, Legal matters; Disaster and Emergency Management Presidency: Organization, Duties; Civil Defense and Disaster Law;: International Disaster Response Law; Civil and Criminal Liability: Civil liability, Criminal liability.

KRY515 Spatial Analysis in Urban Risk Management 3+0 7.5

Basic Concepts: Urban risk management and location intelligence, Urban information systems, Spatial analysis, Vulnerability; Geographical Information Systems in Urban Risk Management: Geospatial data, Spatial information, Spatial data creation stages; Remote Sensing in Urban Risk Management: Remote sensing data sources, Using remote sensing in post-disaster impact and damage detection; Geographical Information Systems in Disaster Studies: Geographic data collection, hazard and risk mapping, Spatial analysis with case scenarios.

KRY516 Earthquake Risk Determination in Reinforced-Concrete Buildings 3+0 7.5

Definitions aAbout Earthquake; Location of the Earthquake, Magnitude of the earthquake, Intensity of the earthquake; Structural Irregularities in RC Buildings: Irregularities in plan, Irregularities in vertical direction; Structural Defects in RC Buildings: Strong beam-weak column problem, Short column problem, Corner column problem, Clerestory problem, Discontinuous frame problem, Lack of stir-up problem, Yetersiz deprem derziLack of expansion joints, Workmanship defects, Low quality concrete, Defects caused by users; Earthquake Damages in RC Buildings: Damages in structural carrier system elements, Damages in non-structural carrier elements.

KRY520 Disaster Hazard and Risk Factors of Turkey 3+0 7.5

Definition and types of disaster: Factors affecting the magnitude of disaster, Disaster statistics; Hazard and Risk: Determination of hazard and risk, Maps of hazard and risk; Earthquake: Internal structure of the earth and plate tectonics, Fault and fault types, Earthquake, Earthquake waves, Earthquake parameters, Factors affecting earthquake, Seismicity of Türkiye, Earthquake regions/hazard maps of Türkiye; Flood: What is flooding, how it occurs?, Types of flood; Landslide: What is landslide, how it occurs?; Avalanche: What is avalanche, how it occurs?; Meteorological disaster; Technological disasters.

KRY522 Disaster Regulation for Local Governments 3+0 7.5

Disaster management system of Türkiye: Disaster and emergency management centers, Important institutions and organizations in terms of disaster management; 5216 numbered metropolitan municipality Law, 5393 numbered municipality law and Law no 5302 on provincial special administration duties; 7269 numbered disaster law, Civil defense law number 7126 and 3194 numbered development law duties; Tasks assigned to local governments under the Türkiye disaster response plan; Law No. 6306 on the transformation of areas at risk of disaster; Building earthquake regulation and ground and basic study application principles.

KRY523 Disaster Logistics 3+0 7.5

Content: Components of disaster, Disaster management; Cities Disaster Resilient: The concept of vulnerability and its applications, The vulnerability of cities, Disaster and resilience, Risk, Natural and technological hazards, Natech Risk Assessment and Management, Na-tech, supply chain, Emergency operations, Transportation, Geographic information systems and spatial analysis, Network analysis, Social/institutional network analysis.

KRY524 Sustainable Urban Resilience 3+0 7.5

Basic Concepts: Hazard, Urban Challenge, Climate Change, Socio-Economic and Cultural Stress, Disaster Risk Management, Urban Sustainability; Global Challenges and Global Trends: Disaster Hazards and Risk, Environment Problems, Development Impediment, Development of Urban Resilience Concept and Its Global Use: What is the Resilience?, Urban Resilience Characteristics; How The United Nations Approach Urban Resilience Concept and Its Urban Resilience Models: Urban Resilience Usage and Meaning, 5 Critical Step and 5 Characteristics for Urban Resilience; Sustainability of the City in the Face of Health Problems.

KRY525 Urban Planning and Geology 3+0 7.5

Urban Planning Definition in Geology and Its Importance; Population and Urban Migration; Urban Planning Structures in Rapid Population Growth: Problems Experienced in the Fields of Economy, Education, Health and Engineering; Growth of Rapidly Migrating Cities Without Engineering Services and Geological Evaluation of Earthquake Risk of These Areas; Urban Phenomenon and Building Quality Question in Our Country After 1999 Marmara Earthquake; Local Geological Characteristics of Cities Where Zoning Plans Are Made / Will Be Planned and Geological Features of the Ground Where Building Foundations will be established; Developments in Urban Planning after TBDY 2019.

KRY526 Rapid Seismic Performance Assessment Methods and Building Inventory Studies 3+0 7.5

Rapid Seismic Performance Assessment Techniques: Rapid visual screening method, Preliminary assessment methods; Structural Irregularities in Reinforced Concrete (RC) Buildings: Irregularities in plan, Irregularities in vertical direction; Structural Defects in RC Buildings: Strong beam-weak column problem, Short column problem, Corner column problem, Clerestory problem, Discontinuous frame problem; Building Inventory Studies: Team training, Blueprint and in-situ investigations, Remote sensing and geographic information systems (GIS) applications.

KRY527 Combating and Adapting to Global Climate Change 3+0 7.5

Climate change: definitions, causes, effects and consequences of climate change, and assessment, principles, the level of crisis; Combating climate change: combating climate change at international, national and local scales, United Nations Framework Convention on Climate Change, the Paris Climate Agreement, the policies to reduce greenhouse gasses; adaptation to climate change: human activities, effects of greenhouse gas emissions on the climate system, disaster risk management, the measures to be taken to combat climate change in the world and in Turkey.

KRY528 Combating and Adapting to Climate Change in Cities 3+0 7.5

Definitions, basic concepts: Climate change, climate crisis, climate system, adaptation to climate change, greenhouse gas emissions, greenhouse effect, resilience, disaster risk reduction; Actions to combat climate change in cities: effects of climate change in cities, impacts of cities on climate change, local climate change action plans; International studies and documents on combating climate change in cities: New Urban Agenda, European Union Urban Charter, United Nations Framework Convention on Climate Change, Paris Climate Agreement; UN 2030 Agenda and Sustainable Development Goals, Sendai Framework for Disaster Risk Reduction.

KRY599 Semester Project 3+0 0.0

LEE501 Open and Distance Education 3+0 7.5

Basics of Open and Distance Education; Open and Distance Education Theories; Open and Distance Education Technologies; Design in Open and Distance Education: System, program, course, material; Learning Process and Differentiating Roles in Open and Distance Education; Support in Open and Distance Education: Educational, social, administrative, technical; Open and Distance Learning Environments: Synchronous and asynchronous environments, learning and content management systems, open access environments; Assessment and Evaluation in Open and Distance Education; Open and Distance Education Management.

LEE503 Design of Online Learning Environments 2+1 5.0

Basic Concepts of Online Learning and Teaching, Dynamics of Online Learning Environments, Paradigms Reflected in the Design of Online Learning Environments and Eclectic Philosophy (3 weeks), Online Learning Environments and Active Learning Strategies, Models in the Design of Online Learning Environments and the PDCA Cycle, Design of Online Learning Environments: Plan (2 weeks), Designing Online Learning Environments: Do (2 weeks), Designing Online Learning Environments: Check (2 weeks), Designing Online Learning Environments: Act.

LEE504 Virtual Relity And Metaverse 3+0 7.5

Introduction to Quantum Mechanics, Introduction to Special and General Relativity, 4G, 5G, 6G and Communication Satellites, Disruptive Technologies, Artificial Intelligence and Applications, Virtual Reality and Applications, Augmented Reality and

Applications, Mixed Reality and Applications, WEB 1.0, WEB 2.0 ve WEB 3.0 Tools, Blockchain and Applications, Concept of Metaverse, Metaverse Support Technologies, Metaverse Application Layers, Future of Metaverse.

LEE505 Digital Culture And Communication 3+0 7.5

Postmodern Theory, Information and Knowledge Societies, Daniel Bell and Post- Industry Society Theory, Manual Castells and Network Society Theory, George Siemens and as a Digital Age Learning Theory, Space and Time Concept in Network Society, Network Generation, Communication Technologies and Production of Digital Culture, Culture Industry of Network Society, Cultures of Digital Nomads and Digital Natives, Culture of 21 Centuries Skills, Lavels of Digital Mastery, Disruptive Digital Technologies, Communication Technologies and Consumption of Digital Culture.

LEE507 Academic Writing 3+0 7.5

In this lesson, the graduate level of academic writing including composition, research, and reporting will be covered. Throughout the lesson, a review of English grammar (word and sentence level) and rhetorical forms (paragraph and beyond) will also be focused on. Specific examples of practices such as finding and evaluating sources, formulating research questions, developing thesis statements, constructing arguments, and carrying out various types of analysis will be carried out.

LEE601 (Eng) Technical English 3+0 3.0

Introduction to Technical English: Basic grammar rules, Technical phrase linkages, Direct phrases, Passive – Indirect sentences; The Control of Phrase Structure in Short Pharagraphs Containing Technical Vocabulary; Practical Studies; Translation Methods from Turkish to English; Application Studies of Translation Methods; The Development of Academic Writing Skills; Studying Technical Subjects; Improving Presentation Ability.

LEE603 Learning and Teaching in Higher Education 3+0 7.5

Basic Concepts; Becoming a University Teacher: Expectations and Realities; Characteristics of University Students and Learning Styles; The World of Educational Paradigms and Learning Theories; Course Design (2 weeks); Instructor-Centered Teaching Strategies; Student-Centered and Active Learning Strategies; Managing the University Classroom; Measurement and Grading in Higher Education; Measurement and Assessment; Ethics and Professional Development in University Teaching; Evaluation of Micro-Teaching Activities (2 weeks).

LOJ511 Carriage of Dangerous Goods 3+0 7.5

The place and importance of carriage of dangerous goods in our country and in the world; ADR document, its definition, importance and purpose; regulations and standards in Turkey; Definition of dangerous goods; The importance of ADR Table A; Classification of dangerous goods and their characteristics; Basic packaging for transporting ADR dangerous goods; Transport documents; Accident written instructions; Liable for the transport of dangerous goods. Marking and labeling; Fire extinguishers; Things to be found in vehicles carrying dangerous material; Basic principles in the loading and unloading of dangerous material. National and international regulation of carriage of dangerous goods by railway. General structure of RID

LOJ512 Supply Chain Design 3+0 7.5

Supply Chain Concept and Scope: Definition of Supply Chain and Supply Chain Management, Decision Phases in a Supply Chain, Process View of a Supply Chain; Supply Chain Drivers and Performance Metrics: Drivers of Supply Chain Performance (Facilities, Inventory, Transportation, Information, Sourcing, Pricing), Supply Chain Drivers Related- Metrics, Financial Measures; Network Design in the Supply Chain: Factors Influencing Network Design Decisions, Capacitated Plant Location Models, Gravity Location Models; Aggregate Planning in a Supply Chain: Definition of the Problem, Aggregate Planning Using Linear Programming; Planning Supply and Demand in a Supply Chain: Predictable variability in the Supply Chain, Managing Supply, Managing Demand; Transportation in a Supply Chain: Modes of Transportation and their Performance Characteristics, Design Options for a Transportation Network; Sourcing Decisions in a Supply Chain: The Role of Sourcing, Outsourcing, Third- and Fourth-Party Logistics Providers, Supplier Selection.

LOJ513 Logistics Principles 3+0 7.5

Definition and development of Logistics: Historical Development and Influencing Factors, Logistics Activities: Transportation, Warehouse Management, Stock Management, Customer Service, Demand Forecasting, Handling, Packaging, Marketing Distribution Channels and Logistics: Logistics and Supply Chain Management: Logistics and Information Technologies: Reverse Logistics: Outsourcing in Logistics: Modern Logistics Applications.

LOJ514 Logistics Planning and Modelling 3+0 7.5

Logistics planning and its importance; Operations Research methodology, Modeling with linear programming; Transportation problems and modeling techniques;Finding the basic basic solution to transportation problems;Simplex Method specific totransportation problems;Transportation Simplex Algorithm. Optimization test and finding entering and leaving variables; Transportation Modes and Selection;Facility Location Selection;Determination of fleet types and size;Cargo consolidation and shipping;Basic concepts related to network models;The shortest path problem and the Dijikstra Algorithm; Minimum spanning tree problem; The maximum flow problem;Route determination and models.

LOJ515 Transportation Economics 3+0 7.5

Fundamental Economic Concepts: Necessities, Goods & Services, Production Costs; Introduction to Transportation Economics: Effect of Transportation on Economic Growth; Features of Transportation Industry; Sub-Systems of Transportation; Economic, Social and Political Functions of Transportation; Microeconomic and Macroeconomic Approaches to Transportation Economics; Supply, Demand and Equilibrium in Transportation; Factors Affecting Transportation Demand; Methods of Transportation Demand Forecasting; Internal and External Costs in Transportation Industry; Pricing in Transportation Industry; Transportation Industry and Policies in Developed Countries; Transportation Policies in European Union; Criteria in the Selection Process of Transportation Systems and Analysis of Utility & Cost; Transactions of Transportation Systems with the Environment; Economic Analysis of Transportation Industry in Turkey, Current Conjuncture & Problems.

LOJ516 Coorporate Communictation In Logistics Bussinesses 3+0 7.5

The concept, functions and characteristics of cooporation; corporate communication and basic concepts; aim of coorporate communicatiob; management of corporate communication: bussiness communication, public relations, organisational communication, managemet communication; Corporate identidy, corporate brand, corporate reputation, corporate image; corporate culture: strategic management in coroporate communication; public relations and advertising in corporate communication; social responsibility in corporate communication, sponsorship.

LOJ517 Human Resources Strategies on Logistics Sector 3+0 7.5

Human Resources Management Concept; Transformation from personnel management to human resources management: causes, differencies, and strategic evaluation; Systematic and strategic thinking on human resources management; Selection, education, career planning, and performans management of human resources for achieving sustainable success; Strategies for gaining benefit from creative and innovative ideas of human resources, competition conditions and flexible working conditionson the motivation and performance of human resources; Strategies for prevent mobbing and cyberslacking; Future of human resources in the logistics sector; Guided readings on logistics sector's human resources management.

LOJ518 Transportation Systems 3+0 7.5

Basic definitions of transportation systems: Importance of Transportation, Types of Transportation; Transportation with Railway Systems: Components of Railway Systems, Importance of Railway Systems in Logistics; Highway Transport: Basic Concepts, The Importance of Highway for Logistics; Airline Transportation: Major Concepts in Airline Transportation, The Place and Importance of Airway in Freight Transportation; Seaway Transportation: Types of Seaway Transportation, Its Importance in Freight Transportation; Pipeline Transportation; Integration of Transport Types: Current Situation of Transportation Modes in Turkey, Required Steps and Measures for the Integration of the Modes.

LOJ519 Warehouse And Inventory Management 3+0 7.5

Forecasting: Subjective forecasting methods, Objective forecasting methods; Fundamentals of Warehousing; Warehouse Activities; Warehouse Types; Warehouse Equipment and Tools; Warehouse Operations; Performance Measurement in Warehouse; Warehouse Management Software; Inventory Types and Inventory Causes; Inventory Costs; Inventory Counting and Classification Systems; Inventory Models: Basic economic order quantity model, Economic production quantity model; Discount Models: Incremental discount, All unit discount.

LOJ520 Logistics Practices 3+0 7.5

Retail Logistics: Concept, Function And Characteristics; Food Logistics: Concept, Function And Characteristics; Textile And Clothing Logistics: Concept, Function And Properties; Electronic Product Logistics: Concept, Function And Properties; Automotive Logistics: Concept, Function And Characteristics; Project And Construction Logistics: Concept, Operation And Characteristics; Tourism Logistics: Concept, Function And Characteristics; Fair And Event Logistics: Concept, Function And Features; Medicine And Hospital Logistics: Concept, Function And Characteristics; Logistics Of Waste And Recycling: Concept, Function And Properties; Animal Logistics: Concept, Function And Characteristics; Rescue And Disaster Logistics: Concept, Function And Characteristics; Knowledge Logistics: Concept, Function And Features; Military Logistics: Concept, Operation And Characteristics.

LOJ521 Digital Marketing 3+0 7.5

Basic Concepts; What is marketing, Old vs new marketing rules, the five Ps of internet marketing, Digital Marketing Strategy; Digital marketing, Digital marketing Strategy, Web development and Design; Web design, Step-by-step guide to building a website, Customer Relationship Management; Key terms and concepts, A CRM model, Understanding customer, CRM and data, Benefit of CRM, Online Advertising; Key terms and concepts, Online advertising objectives, Types of display adverts, Mobil marketing; The role of mobile personal communication, Mobile messaging channels, Mobile commerce, İntegrating mobile into online marketing, Augmented reality.

LOJ522 Coaching and Leadership Skills for Managers 3+0 7.5

Basic Concepts; Coaching, Mentoring, Leadership, Characteristics of the coach, The Origin of Coaching, The Origin of Mentoring, The difference of the Coaching Profession in other professions, Coaching in the corporate environment, mentoring and leadership, The role of Managers in Coaching, mentoring and Leadership. Basic Coaching Communication; Coaching and leadership based communication, deep listening, asking strong questions, giving feedback. Basic Coaching Steps; Goal, Motivation and Action steps. The Basic Coaching Tools are; Pre-interview, life circle, values study and three chair practice. The concept of leadership; Holistic Leadership, Leadership styles.

LOJ599 Term Project 3+0 0.0

LOJ601 Logistics Planning and Modelling 3+0 7.5

Logistics Concept; Historical Development of Logistics; Logistics Management and Supply Chain Management; Strategical, tactical and operational logistics applications; Logistic Network Design; Distribution Logistics and Models; Facility Location Problems; Hub Location Problems: Fixed costs hub location, p-hub median problems and mathematical models; Travelling Salesman Problems and Solution Techniques; Multiple Travelling Salesman Problem and Heuristic Solutions: Hill-Climbing Algorithm; Vehicle Routing Problems: Models, Constructive and Improvement Solution Algorithms.

MAT502 Analysis 3+0 7.5

Tensor Algebra; Differential Forms; Exterior Derivative and Its Properties; Fields; Orientation; Volume Element; Poincare Lemma; Singular Cubes; Stokes Theorems on Open Sets; Manifolds; Manifolds With Boundary; Differentiable Mappings; Tangent and Cotangent Spaces; Differential Forms and Fields on Manifolds; Stokes Theorem on Manifolds; Classical Theorems of Green; Gauss and Stokes.

MAT503 Topology 3+0 7.5

Topological Spaces; Basic Concepts; Neighborhoods; Base and Sub base; Continuous Functions; Product Spaces; Quotient Spaces; Convergence; Nets and Filters; Separation and Countability; Separation Axioms; Countability Properties; Compact Spaces; Local Compact Spaces and Compactness; Metrizable; Complete Metric Spaces and Baire's Theorems; Connected Spaces; Local-Connectedness and Path-Connectedness.

MAT504 Differential Equations 3+0 7.5

Differential Equation; Classical Solution and Solution Concepts; Isoclines; Phase Space; System of the Linear Differential Equations; Wronskian, Gronwall Inequality; Nonlinear Differential Equations; Existence; Uniqueness and Extendibility of Cauchy Problem Solution; Dependence of Solutions on Initial Condition and Parameters; Numerical Solution Methods; Stability of Solutions; Lyapunov Theorems; Linear First Order Partial Differential Equations; Existence and Uniqueness of Cauchy Problem Solution; Characteristics Method.

MAT506 Reel Analysis 3+0 7.5

Measure Theory; Measure in the Plane; Lebesgue Measure and Its Properties; Measurable Functions; Convergence; Lebesgue Integral and Its properties; Lebesgue; Fatou and Levi Theorems; Differentiation of an Lebesgue Integral With Respect to its Upper Limit; Monotone Functions; Differentiation of Monotone Functions; Differentiation of An Integral With Respect to Its Upper Limit; Functions of Bounded Variation; Differentiation of the Indefinite Lebesgue Integral; Absolutely Continuous Functions; L Spaces.

MAT507 Applied Mathematics I 3+0 7.5

Rectangular Coordinates; Coordinate Transformations: Polar, Cylindrical and Spherical Coordinates; Scalar and Vector Fields; Gradient;, Divergence and Curl; Volume Integrals; Line Integrals and Surface Integrals; Gauss's Theorem; Stoke's Theorem; Linear Spaces; Subspaces .Linear Combinations and Linear Dependence; Hilbert Space; Orthogonal Complements; The Gram-Schmidt Procedure; Complete Orthonormal Sequences; Fourier Series; Fourier Series of a Periodic Functions; Approximations.

MAT507 (Eng) Applied Mathematics I 3+0 7.5
Rectangular Coordinates; Coordinate Transformations: Polar, Cylindrical and Spherical Coordinates; Scalar and Vector Fields; Gradient;, Divergence and Curl; Volume Integrals; Line Integrals and Surface Integrals; Gauss's Theorem; Stoke's Theorem; Linear Spaces; Subspaces .Linear Combinations and Linear Dependence; Hilbert Space; Orthogonal Complements; The Gram-Schmidt Procedure; Complete Orthonormal Sequences; Fourier Series; Fourier Series of a Periodic Functions; Approximations.

MAT508 Applied Mathematics II 3+0 7.5
Linear Transformations; Inverse Transformation; Laplace transformation; Laplace Transformation and Differential Equations; Fourier Transformation; Partial Differential Equations; The Classical Partial Differential Equations; The One-Dimensional and Two-Dimensional Wave Equations; The One-Dimensional and Two-Dimensional Heat Equations; Separation of Variables; Laplace's Equation in a Circular Region; Laplace's Equation in a Sphere; Laplace Transformation and Fourier Transformation Applied to Partial Differential Equations.

MAT508 (Eng) Applied Mathematics II 3+0 7.5
Linear Transformations; Inverse Transformation; Laplace transformation; Laplace Transformation and Differential Equations; Fourier Transformation; Partial Differential Equations; The Classical Partial Differential Equations; The One-Dimensional and Two-Dimensional Wave Equations; The One-Dimensional and Two-Dimensional Heat Equations; Separation of Variables; Laplace's Equation in a Circular Region; Laplace's Equation in a Sphere; Laplace Transformation and Fourier Transformation Applied to Partial Differential Equations.

MAT509 Algebraic Topology I 3+0 7.5
Categories; Functors; Homotopy Category; Fundamental Group; Simply Connected Spaces; Contractible Spaces; Covering Projections; Deck-Transformations; Classification of Covering Spaces; Topological Groups; Group Actions; Computation Methods for the Fundamental Group; Higher Homotopy Groups; Wedge and Suspension; Fiber Bundles; Exact Sequences; Exact Homotopy Sequence of Fiber Bundles.

MAT510 Algebraic Topology II 3+0 7.5
Axiomatic Homology and Cohomology Theories; Eilenberg-Steenrod Axioms; Elementary Homological Algebra; Singular Homology and Cohomology Theory as Model of Eilenberg-Steenrod Axioms; Method of Acyclic Models; Computation of Homology and Cohomology Groups of Spheres; Brouwer Fixed-Point Theorem and Other Geometric Applications; Products in Cohomology and Cohomology Ring; Eilenberg-Zilber Theorem.

MAT511 Dynamical Systems I 3+0 7.5
Linear Systems; Diagonalization; Exponentials of Operators; The Fundamental Theorem for Linear Systems; Linear Systems in R2; Complex Eigenvalues; Multiple Eigenvalues; Jordan Forms; Stability Theory; Non homogeneous Linear Systems; Nonlinear Systems; Local Theory; The Fundamental Existence-Uniqueness Theorem; Dependence on Initial Conditions and Parameters; Maximal Interval of Existence.

MAT512 Dynamical Systems II 3+0 7.5
The Flow Defined by a Differential Equation; Linearization; The Stable Manifold Theorem; Hartman-Grobman Theorem; Stability and Liapunov Functions. Nonlinear Systems; Global Theory; Dynamical Systems and Global Existence Theorems; Limit Sets and Attractors; Periodic Orbits; Poincare Map; Stable Manifold Theorem for Periodic Orbits; Poincare-Bendixson Theory in R2.

MAT513 Axiomatic Sets Theory 3+0 7.5
Mathematical logic; Formal systems; Basic proof methods; The work of Cantor; Paradoxes; Discussions about the basic of mathematics; Ways of solution; ZF and ZFC axioms; NGB set theory; Ordinal numbers; Transitive models; Consistemy discussions.

MAT515 Engineering Mathematics 3+0 9.0
Approximation Theory: Discrete least squares approximation, Orthogonal polynomials and least square approximations, Chebyshev polynomials and economization of power series, Rational function approximation, Pade rational approximation, Chebyshev rational approximation, Trigonometric polynomial approximation; Gamma and Beta Functions: Taylor series expansion of Gamma function, Stirling?s approximation for ?(N) for large N; Error Functions; Finite Differences; Linear Difference Equations: First degree difference equations, Second degree difference equations, High degree difference equations, Difference equations systems.

MAT517 Applied Mathematics 3+0 7.5
Vector Spaces; Subspaces; Linear Dependence And Linear Independence; Basis; Linear Mappings; Matrices; Matrix Representation of A Linear Mappings; System of Linear Equations; Eigenvalues And Eigenvectors; Inner Product Spaces;

Differential Equations And Their Solutions; First Order Ordinary Differential Equations And Their Applications; Higher Order Linear Differential Equations And Their Applications; Systems of Linear Differential Equations.

MAT519 Algebra 3+0 7.5
Rings; Ideals; Quotient Rings; Integral Domains; Principal Ideal Rings; Euclidean Rings; Polynomial Rings; Vector Spaces; Linear Transformations; Matrix Representation of Linear Transformations; Dual Spaces; Modules; Algebra of Linear Transformations; Eigenvalues; Eigenvectors; Minimal Polynomials; Canonical Forms; Triangular Forms; Jordan Forms; Rational Canonical Forms; Hermitian, Unitary and Normal Transformations; Real Quadratic Forms.

MAT520 Lie Algebras 3+0 7.5
Simple and Semi Simple Algebras; Killing Form; Cartan?s Criteria; Structure Theorems; Representations; Relations with Lie Groups; Cartan Sub-Algebras; Root Systems; Coxeter-Dynkin Diagrams; Classification of Complex Semi Simple Lie Algebras.

MAT521 Geometric Topology 3+0 7.5
Surfaces and Cell-Decomposition; Surgery; Fundamental Groups and Methods of Calculation; Van Kampen's Teorem; Edge Group of a Complex and its Relation with the Fundamental Group.

MAT523 Introduction to Riemann Geometry 3+0 7.5
Differentiable Manifolds; Tangent Spaces;Tangent Bundles; Riemannian Manifolds; Levi- Civita Connections; Geodesics; Curvature Tensors; Curvature and Local Geometry.

MAT524 Geometry of Differantial Forms 3+0 7.5
Manifolds, Lie groups, Vector fields, Differential forms, Exterior algebra, Lie derivative, Frobenius theorem, Vector-valued differential forms, Maurer-Cartan form, Homology of manifolds, Stokes theorem, de Rahm theorem, Hopf invariant, Massey product, Cohomology of compact Lie groups, Mapping degree.

MAT525 Equations of Mathematical Physics I 3+0 7.5
Boundary-Value Problems of Mathematical Physics: Some concepts from the theory of functions and operator theory, Fundamental equations of mathematical physics, Classification of quasi-linear differential equations of the second order, Setting basic boundary-value problems for second-order linear differential equations; Generalized Functions: Basic and generalized functions, Differentiation of generalized functions, Convolution of generalized functions, Generalized functions of slow increase, Fourier transform of the generalized functions of slow increase; Fundamental Solutions and The Cauchy Problem: Fundamental solutions of linear differential operators, Wave potential, Cauchy problem for wave equation, Propagation of waves, Cauchy problem for the equation of thermal conductivity.

MAT526 Equations of Mathematical Physics II 3+0 7.5
Integral Equations: Method of sequential approximations, Fredholm?s theorems, Integral equations with the Hermitian kernel, Hilbert-Schmidt theorem and its consequences; Boundary-Value Problems for the Equations of Elliptical Type: Eigenvalue problems, Strum-Liouville problem, Harmonic functions, Fourier's method for eigenvalue problems, Newton potential, Boundary-value problems for the equations of Laplace and Poisson in the space, Green?s function, Dirichlet problem, Boundary-value problems from Laplace?s equation on the plane; The Mixed Problem: Fourier's method, Mixed problem for the hyperbolic equation, Mixed problem for the parabolic equation.

MAT527 Numerical Solutions of Partial Differential Equations 3+0 7.5
Basic Concepts of Finite Difference Method; Finite Difference Methods for Parabolic Partial Differential Equations; Convergence, Stability and Consistency; Finite Difference Methods for Elliptic Partial Differential Equations; Finite Difference Methods for Hyperbolic Partial Differential Equations.

MAT528 Optimization Methods I 3+0 7.5
Unconstrained Optimization: Functions of One Variable, Functions of Several Variables, Positive and Negative Definite Matrices and Optimization, Coercive Functions and Global Minimizers, Eigenvalues and Positive Definite Matrices; Convex Sets and Convex Functions: Convex Sets, Convex Functions, Convexity and the Arithmetic-Geometric Mean Inequality, Unconstrained Geometric Programming, Convexity and Other Inequalities; Iterative Methods for Unconstrained Optimization: Newton's Method, Gradient Method, Broyden's Method, Secant Methods for Minimization; Convex Programming and the Karush-Kuhn -Tucker Conditions: Separation and Support Theorems for Convex Sets, Convex Programming and the Karush-Kuhn -Tucker Theorem, Karush-Kuhn -Tucker Theorem and Constrained Geometric Programming, Dual Convex Programming.

MAT529 Optimization Methods II 3+0 7.5
Convex Programming and the Karush-Kuhn-Tucker Conditions; Seperation and Support Thorems for Convex Sets, Convex Programming:Karush-Kuhn-Tucker Theorem, Karush-Kuhn-Tucker Theorem and Constrained Geometric Programming,

Dual Convex Programming, Lagrangian Duality and Saddle Point Optimality Conditions; The Lagrangian Dual Problem, Duality Theorems and Saddle Point optimality Conditions, Properties of the Dual Functions, Formulating and the Solving of the Dual Problem, Getting the Primal Solution, Linear and Quadratic Programs, Least Squares Optimization; Least Squares Fit,Subspaces and Projections, Minimum Norm Solutions of Undetermined Linear Systems; Generalized Inner Products and Norms:The Portfolio Problem, Penalty Methods; Penalty Functions, The Penalty Method, Applications of the Penalty Function Method to Convex Programs.

MAT530 Introduction to the Theory of Nonlinear Optimization 3+0 7.5

Existence Theorems for Minimal Points; Problem Formulation, Existence Theorems, Set of Minimal Points, Generalized Derivatives; Directional Derviative, Gateaux and Frechet Derivatives, Subdifferantial, Quasidifferantial, Clarke Derivative, Tangent Cones; Definition and Properties, Optimality Conditions, A Lyusternik Theorem, Generalized Lagrange Multiplier Rule; Problem Formulization, Necessary Optimality Conditions, Sufficient Optimality Conditions.

MAT531 Tensor Analysis 3+0 7.5

Tensor fields, tensor product, some specific tensor fields, Tensor at a point, Components of tensor, Contraction, Tensor derivation, Metric tensor, Levi-Civita connection, Curvature tensor, Ricci curvature, Bianchi identities, Some basic differential operators.

MAT532 Functional Analysis 3+0 7.5

Normed Vector Spaces; Examples of Normed Spaces; Product of Normed Spaces; Continuous Functions Between Normed Spaces; Sequences and Completeness ; Finite Dimensional Vector Spaces; Banach Spaces; Contraction Mapping Theorem; Integral and Differential Equations; Linear Mappings; Bounded Operators; The Space of Bounded Linear Transformations; Open Mapping Theorem; Closed Graph Theorem; Hahn-Banach Theorem; Inner Product Spaces; Hilbert Spaces; Self-Adjoint Bounded Linear Operators; Compact Operators; Self-Adjoint Compact Operators; Orthonormal Sets; Gram-Schmidt Orthogonalization Process.

MAT533 Differentiable Manifolds 3+0 7.5

Definition of Manifolds and Examples: Atlas; Smooth Structure; Manifolds As Subsets of Rn; Grassmannian Manifolds and Projective Spaces; Topological Properties of Manifolds. Smooth Mappings: Smooth Mapping between Manifolds; Diffeomorphisms; Partition of Unity. Tangent Vectors: Tangent Vectors on a Manifold; Differential of Maps between Manifolds; Expressing Tangent Vectors in Local Coordinates; Tangent Vectors of Curves. Vector Fields: Vector Bundles; Vector Fields. 1-Forms: Cotangent Bundles; 1-Forms; Push-Forward and Pull-Back of Vector Fields and 1-Forms.

MAT534 Selected Topics in Algebra 3+0 7.5

The Algebra Concept: Definitions and Examples; Structure Constants; Division Algebras; Normed Algebras: Cayley-Dickson Process; Associator; Alternativity; Hurwitz Theorem; Artin Theorem; Quaternion:Geometric interpretations and applications; Octonions: Moufang identities; Double; Triple and Quadruple Vector Cross Products; Characterization of Double Vector Cross Products and Determination of the Dimension in Which They Exist.

MAT535 Hyperbolic Geometry 3+0 7.5

Axioms of Hyperbolic Geometry; Upper Half Plane Model for Hyperbolic Plane; General Möbius Group: Cross Ratio; Classifications of Möbius Transformations; Reflections; Length and Distance in Upper Half Plane Model: Arc-Length Element; Hyperbolic Metric and Isometrics; Other Models for Hyperbolic Plane: Poincaré Disk Model; Projective Disk Model; Hyperbolic Area and Gauss-Bonnet Formula Hyperbolic Trigonometry; Higher Dimensional Hyperbolic Spaces.

MAT539 Fractal Geometry 3+0 7.5

Fractal Examples: Contour Set; Koch Curve; Sierpinski Triangle; Menger Spongene; Examples From Nature; Iterated Function Systems: Metric spaces and Banach fixed point theorem; Hausdorff Metric; Iterated Function Systems; Collage Theorem; Dimension: Space-Filling Curves; Topology Dimension; Hausdorff Dimension; Fractal Dimension and Application; Iteration of Complex Functions: Julia sets; Mandelbrot set.

MAT542 Game Theory 3+0 7.5

Two-Person Zero-Sum Game; Maxmin Criterion; Von Neumann Theorem; Solution Concept; Domination; Worthwhile Strategies; Methods of Solution to the Matrix Game; Two-Person Non-Zero-Sum Finite Game; Maxmin Strategies And Equilibrium Pairs; Nash?s Theorem; Swastika Method; Cooperative Games; Jointly Randomized Strategies; Bargaining Set and Bargaining Procedure; Two-Person Zero-Sum Non-Matrix Game; Existence of The Solution; Ky Fan Inequality; Two-Person Non-Zero-Sum and Non-Matrix Game; Existence of The Equilibrium Pairs; Nikaido-Isoda Theorem; Differential Game; Positional Strategy; Existence of Value; Approach-Evasion Problem; Extremal Aiming Method; Existence of Alternative.

MAT545 Integral Equations I 3+0 7.5

Introduction and Basic Concepts: Classification of integral equations, Problems reduced integral equations; Fredholm Theory: Fredholm?s formulas, Integral equations with degenerate kernels, Fredholm?s theorems; The Contraction Operator Pirinciple: The contraction operator pirinciple, Applications of contraction operator to integral equations; Linear İntegral Equations: Application of linear operator to integral equations, The fredholm theorems for general fredholm integral equation, Kernels with weak singularities, Character of solution of integral equation; İntegaral Transforms: Fourier transform , Laplace transform, Mellin transform, Wiener-Hopf?s method.

MAT546 Integral Equations II 3+0 7.5

Symmetric integral equations, Symmetric operators, Hilbert-Schmidt theorem, Solutions of operator equations, Integral equations with symmetric kernels, Hilbert-Schmidt theorem for integral equations, Characteristic values and extremal properties of characteristic functions, Equations that can be reduced to symmetric equations, Classification of symmetric kernels, Green?s function, Reduction of boundary value problems to integral equations; Integral Equations of the First Kind, Volterra equations of the first kind, Fredholm equations of the first kind, Operator equation of the first kind; Singular İntegral Equations, NonFredholm integral equations , Hilbert transform.

MAT547 Asymptotic Methods in Analysis 3+0 7.5

Introduction: Order symbols; Asymptotic equivalence; Asymptotic series; Operations on asymptotic series; Implicit Functions: Lagrange inversion formula; Applications; Iteration methods; Roots of equations; Asymptotik iteration; Sum: Euler-Maclaurin summation formula; Striling formula for the Gamma function; Alternating sums; Poisson summation formula; Laplace Method for Integrals: General case; Asymptotic expansion; asymptotic behavior of the Gamma; Multiple integrals; Saddle Point Method: Steepest descent method; Small perturbations; Applications of saddle point method; Indirect Asymptotics; Iterated Functions.

MAT548 Numerical Solutions of Ordinary Differential Equations 3+0 7.5

Basic Concepts: Definition of ordinary differential equations, Definition and basic concepts of initial value problems of ordinary differential equations, Difference equations; Single-step Methods: Taylor series method, Euler method, Runge Kutta methods, Convergence analysis, Stability analysis, Implicit Runge Kutta methods, Obrechkoff methods; Multistep Methods: Explicit multistep methods, Implicit multistep methods, General linear multistep methods, Stability analysis, Convergence analysis.

MAT549 Introduction to Graph Theory 3+0 7.5

Definitions and Examples: Graph, Vertex, Edge, Degree; Paths and Cycles: Connectivity, Eulerian graphs, Hamiltonian graphs; Trees: Properties of trees, Counting trees, Applications; Planarity: Planar graphs, Kuratowskis theorem, Eulers formula, Dual graphs; Colouring Graphs: Colouring vertices, Colouring maps, The four-color theorem, Colouring edges; Matching: Halls marriage theorem.

MAT551 Ring and Module Theory 3+0 7.5

Modules: Submodules, Ideals, Intersection and sum of submodules; Factor Modules; Module and Ring Homomorphisms; The Jordan-Hölder-Schreirer Theorem; Endomorphism Ring of a Module; Exact Sequences; Direct Product and Direct Sum of Modules; Free Modules; Large and Small Modules; Injective Modules: Injective Hulls; Projective Modules: Projective covers; Baer's Criteria; Artinian Modules (Rings); Noetherian Modules (Rings).

MAT552 Introduction to Mathematical Elasticity 3+0 7.5

Introduction: Mathematical Preliminaries, Cartesian tensors, Operational tensors; Stress and Equilibrium: State of Stress, Equations of equilibrium, Principal stress, Properties and special states of stress; Deformations: Strain, Physical interpretation of strain tensor, Principal strains, Volume and shape changes, Compatibility; Material Behaviour; Formulation, Uniqueness, Solution strategies; Extension, Bending, Torsion; Two-dimensional Elasticity: Plane Stress Equations, Plain strain equations.

MAT553 Fuzzy Set Theory 3+0 7.5

Fuzzy Sets: The concept of fuzzy set; Operations of Fuzzy Set: Complement, Inclusion, Intersection, Union and other operations in a fuzzy set; Fuzzy Relation: Relation, Properties of relation, Definition of fuzzy relation and extension of fuzzy sets; Fuzzy Numbers: Definition of fuzzy numbers, Characterization theorems for fuzzy numbers, L-R fuzzy numbers, Fuzzy Algebraic Operations: Zadeh's extension principle, The sum and scalar multiplication, multiplying two fuzzy numbers, Difference of fuzzy numbers; Fuzzy Inference: Linguistic variables, The interpolation feature of fuzzy inference systems.

MAT554 Integral Transforms and Their Application 3+0 7.5

Basic Concepts and Definitions; Fourier Transforms: Definition basic properties of the transform, Applications of transform, Fourier cosine and sine transforms with examples, Multiple Fourier transform; Laplace Transforms: Definition basic properties of the transform, Applications of the transform, Finite Laplace transforms; Hankel Transforms; Definition basic properties of transform, Applications of transforms; Melin Transforms: Definition of the transform and examples, Basic

properties of transform, Applications of transforms; Hilbert and Stieltjes Transforms, Definition basic properties of transforms, Their applications.

MAT555 Introduction to Chaotic Dynamical Systems 3+0 7.5

The Definition and Examples of Dynamical System; Iteration of Functions: Types of orbits; Fixed points, Periodic points, Contraction mapping and the contraction mapping theorem; Period-3 Theorem; Sharkovsky Theorem; Attracting and Repulsive Periodic Points; The Tent Map; The Doubling Map; The Logistic Map; Families of Functions; Bifurcations; Cantor Set; Symbolic Dynamics: The squence space, The shift map; Chaos: Sensitive dependence on initial conditions, Transitivity, Topological conjugacy; Two Dimensional Chaos: The Henon map, The horseshoe map.

MAT556 Linear Programming 3+0 7.5

Standard Form of Linear Programming Problem; Karush-Kuhn-Tucker Optimality Conditions; Geometry of an Linear Programming Problem: Convex hull, Politopes and its facets, Edges and vertices, Feasible descent directions, Finding a vertex; Vertex Minimizers: Finding a vertex minimizer, Uniqueness; Simplex Method: Basic and nonbasic variables, Simplex algorithm; Primal and Dual Solutions; Introduction to Interior Point Methods.

MAT558 Vector Analysis 3+0 7.5

Curves; Multi-Variable Functions: The derivative and Jacobian matrix; Multiple Integration; Surfaces: Parametric surfaces, Curves on surface and surface area, Orientation; Vector Fields: Integral curve, Gradient, Divergence, Rotational; Line Integrals of Scalar Valued Functions; Line Integrals of Vector Fields; Green's Theorem; Surface Integrals: Surface integral of scalar valued functions, Integral of vector fields on surfaces; Stokes' Theorem and Divergence Theorem; Differential Forms on R^n : Basic properties of the forms, Exterior derivative, Basic properties of the induced mappings; Integrals of Differential Forms: Stokes' Theorem.

MAT592 Seminar 3+0 7.5

MAT601 Stability of Linear Systems 3+0 7.5

Linear Systems; Stability of Matrices and Polynomials; Uncertain Systems; Robust Stability; The Value Set Approach; Zero Exclusion Principle; Kharitonov's Theory; Stability Bounds; Stability of Polytopes of Polynomials; Polytopes of Polynomials; Stability of Convex Combinations; Edge Theorems; Convex Directions: Definitions; Rantzer's Growth Condition; Schur Stability; Schur Stability of Interval Polynomials and Matrices; Weak and Strong Kharitonov Regions; Multi linear Structures and Mapping Theorem; Spherical Polynomial Families.

MAT602 Stability of Nonlinear Dynamical Systems 3+0 7.5

Nonlinear Differential Equations; Definitions; Existence and Uniqueness; Geometric Interpretation; Stability: Critical Points and Attractors; Stability and Asymptotic Stability; Linearization and Lyapunov Theory; Stability of Periodic Solutions; Stability of Two-Dimensional Autonomous Systems; Applications; Stability Analysis by the Direct Methods; Lyapunov Functions; Rantzer's Theorem; Bifurcation and Chaos; Hopf Bifurcation; Lorentz Equation; Chaos and Chaotic Maps.

MAT603 Convex Analysis 3+0 7.5

Lower and Upper Semi Continuous Functions; Ekeland's Varitional Principle; Convex Sets and Functions; Continuity of Convex Functions; Yosida-Moreau's Approximation; Separation Theorems; Conjugate of the Convex Functions; Properties; Young-Fenchel's Inequality; Dual Problem; Fenchel's Theorem. Directional Derivability of Convex Functions; The Sub differential Concept; Subdifferentiability of Convex Functions; Sub differential Calculus; Tangent and Normal Cones of Convex Sets; Minimization of Convex Functions; Properties of Convex Set-Valued Maps.

MAT604 Topological Vector Spaces 3+0 7.5

Topological Vector Spaces; Convex; Balanced; Absorbing Sets; Neighborhoods of the Zero Vector; Subspaces; Quotient Spaces; Continuous Linear Mappings; Finite Dimensional Topological Vector Spaces; Normability of a Topological Vector Spaces; Locally Convex Topological Vector Spaces; Semi Norms; Locally Convex Topological Vector Spaces Generated by Semi Norms; Barrel Spaces; Convex; Compact Spaces.

MAT605 Differential Inclusions Theory 3+0 7.5

Set-Valued Maps; Differential Inclusion Concept; Existence of Cauchy Problem Solutions of Differential Inclusion With Convex Valued Right Hand Side Set-Valued Map; Closedness and Initial Condition Dependence of Solutions Set; Local Properties of Solutions; Reachable Sets and Integral Funnel of Differential Inclusions; Filippov's Theorem. Existence of Cauchy Problem Solutions of Differential Inclusion With Nonconvex Valued Right Hand Side Set-Valued Map, Relaxation Theorem; R-Solution Concept; Approximate Computation of Reachable Sets; Weakly and Strongly Invariant Sets With Respect to Differential Inclusions.

MAT606 Riemannian Geometry 3+0 7.5

Differentiable manifolds: Differentiable manifold, Differentiable functions, Tangent space, Immesions and Imbeddings, Vector fields, Bracets, Tensors, Orientation; Riemannian Manifolds: Riemannian metric, Riemannian manifold, Afin connection, Riemannian connection, Geodesics, Convex neighborhoods; Curvature: Curvature, Sectional curvature, Ricci curvature, Scalar curvature, Tensors on Riemannian manifolds, Jacobi fields, Hopf-Rinow Theorem; Spaces of constant curvature.

MAT607 Topological Groups 3+0 7.5

Topological Groups; Neighborhoods Systems of a Point in a Topological Groups; Isomorphism and Local Isomorphism; Subgroups; Quotient Groups; Products of Topological Groups; Continuous Homeomorphisms; Direct Product of Topological Groups; Connected and Disconnected Groups; Uniform Structures on Topological Groups; Complete Groups; Completions of a Topological Group; Compactness in Topological Groups; Locally Compact Groups; Topological Transformations Groups.

MAT608 Analysis on Fractals 3+0 7.5

Geometry of Self-Similar Sets; Constructions of Self-Similar Sets; Shift Space and Self- Similar Sets; Self-Similar Structure; Self-Similar Measure; Dimension of Self-Similar Sets; Laplacians on Fractal Sets; Dirichlet Forms and Laplacians on a Finite Sets; Sequence of Discrete Laplacians; Constructions of Laplacians on P.C.F. Self-Similar Structures; Harmonic Structures; Harmonic Functions; Dirichlets Forms on P.C.F. Self-Similar Sets; Green's Function; Green's Operator.

MAT609 Knot Theory 3+0 7.5

Basic Definitions and Notations; Knot in the Plane; Jordan Curve Theorem and Chard Theorem; Torus Knots; Solid Torus; Connected Sums and the Knot Group; Seifert Surfaces; Cyclic Coverings and Torsion Invariants; Knots and Surgery in; S3 Infinite Cyclic Coverings and the Alexander Invariants; Otomorphics Sets and Quandle, Invariants Obtained From Quandle; Conway and Jones Polynominals; Knots With 2-Bridges and Insufficiency of Jones Polynomials; Mutants; Generalized Polynomials; Coefficients of Conway Polynomials and Its Relation With Alexander Polynomial.

MAT610 Basic Topics of the Set Valued Analysis 3+0 7.5

Set-Valued Map Concept; Upper and Lower Semi continuity of Set-Valued Maps; Selectors of Set-Valued Maps; Michael's Theorem; Steiner Point; Lipschitz Selectors; Marginal Functions and Properties; Parameterization of Set-Valued Maps; Caratheodory Parameterization; Contingent Cones; Derivative Sets of Set-Valued Maps; Fixed and Equilibrium Points of Set-Valued Maps; Kakutani Theorem; Integral of Set-Valued Maps; Bang-Bang Principle.

MAT611 Introduction to Gauge Theory 3+0 7.5

Principal Bundles; Transition Functions; Bundle Maps and Equivalence; Principal G-Bundles Over Spheres; Hopf Bundle; Vector Valued 1-Forms; Connections Over Vector Bundle; Connections Over Principal Bundles and Equivalence; Curvature and Gauge Fields; The Yang-Mills Functional; Hodge Dual For 2-Forms In Dimension Four; The Modular Space; Matter Fields; Associated Fiber Bundles; Matter Fields and their C Variant Derivatives; Seiberg-Witten Equations.

MAT612 Fractals and Kaos 3+0 7.5

Iterated Function Systems; Fractal Dimension; Hausdorff Dimension; The Notion of Chaos; Chaos on Fractals; Symbolic Dynamics; Logistic Chaos And Bifurcation; Henon - Lorenz Exemples; Lyapunov Exponentiels.

MAT613 Clifford Algebras 3+0 7.5

Symmetric Bi-Linear Forms; Quadratic Forms; Tensor Product of Vector Spaces; Tensor Algebra; Tensor Product of Algebras; Definitions of The Clifford Algebra And Its Universal Property; Other Properties of Clifford Algebras; The Involution And The Anti-Involution of Clifford Algebra; Odd And Even Parts of Clifford Algebra; Non-Degenerate Real Clifford Algebras And Their Classifications; Degenerate Real Clifford Algebras; Representations of Real Clifford Algebras; Complex Clifford Algebras And Their Representations; Pin And Spin Groups; Spinors; Triality.

MAT614 Continuous Modules 3+0 7.5

Injectivity and Related Concepts: A-incective Modules; Quasi-injective Modules, Exchange and Cancellation Properties, Decomposition Theorems, Quasi-Continuous Modules: Basic Properties, Direct Sums of Quasi-Continuous Modules, Decompositions of Quasi-Continuous Modules; Internal Cancellation Property, Quasi-Continuity Versus Quasi-injectivity; Continuous Modules: Endomorphism Modules; Endomorphism Rings, Continuous Modules, The Exchange Property.

MAT615 Compact Operators 3+0 7.5

Compact Operators and their General Properties; The Theory of Riesz-Schauder for Compact Operators; Spectral Properties of Compact Operators; Compact Self-Adjoin Operators; Fredholm Andvolterna Integral Equations; Differential Equations; Eigen Value Problems and Green?s Functions.

MAT616 Fiber Bundles 3+0 7.5
Manifolds; Local Triviality; Vector Bundles; Transition Maps; Operations On Vector Bundles; Sub Bundles; Sections of Vector Bundles; Maps Between Vector Bundles; Metric Structures on Vector Bundles; Frame Bundles; Normal Bundles; Covariant Derivative; Curvature Tensor; Lie Groups; Principal Fiber Bundles; Structure Groups; Grassman Bundles; Universal Bundle; Associated Vector Bundles; Vector Valued Forms; Connection; Connection Forms on a Principal Bundle; Curvature Form; Spinor Bundles.

MAT619 Vector Optimization I 3+0 7.5
Convex Analysis: Linear spaces, partially order linear spaces, topological linear spaces and convex sets, Convex maps and differentiability, Some fundamental theorems: Zorn?s Lemma, Hahn Banach theorem, separation theorems, Contingent cones and Lyusternik theorem; Theory of Vector Optimization: Optimality notions, Scalarization, Existence theorems, Generalized Lagrange multiplier rule.

MAT620 Vector Optimization II 3+0 7.5
Duality: A general duality principle, Duality theorems for abstract optimization problems, Specialization to abstract lineer optimization problems; Vector Approximation: Simultaneous approximation, Generalized Kolmogorov condition, Nonlinear Chebyshev vector approximation, Linear Chebyshev vector approximation, Duality results; Cotingent Epiderivatives: Cotingent derivatives and cotingent epiderivatives, Properties of cotingent epiderivatives, Cotingent epiderivatives of real valued functions, Generalized cotingent epiderivatives; Subdifferentials: Concept of subdifferentials, Properties of subdifferentials, Weak subdifferentials; Optimality Conditions: Optimality conditions with cotingent epiderivatives, Optimality conditions with subgradients, Generalized Lagrange multiplier rule.

MAT621 Metric Geometry 3+0 7.5
Metric Spaces, Length Spaces, Spaces of Bounded Curvature, Smooth Length Structures, Curvature of Riemannian Metrics, Spaces of Metric Spaces.

MAT622 Characteristic Classes 3+0 7.5
Vector Bundles; Stiefel-Whitney Classes; Stiefel-Whitney Numbers; Grassman Manifolds and Universal Bundles; Cohomology Ring of Grassman Manifolds; Construction of Stiefel-Whitney Classes; Oriented Bundles and the Guler Class; Thom İsomorphism Theorem; Complex Vector Buudles; Chern Classes; Pontrjagin Classes; Chern Numbers; Pontrjagin Numbers.

MAT623 Bochner Technique on Riemannian Manifolds 3+0 7.5
Gradient of a Function; Divergence of a Vector Field and of a (1,s)- Tensor Field; Hessian and Laplacian Operators; Killing Vector Fields; Conformal Killing Vector Fields; Harmonic Vector Fields; Bochner Formula for Any Vector Field; Weitzenböck Formula for Amy Function and its Applications to Eigenfunctions of Laplace Operator.

MAT624 Stability of Switched Linear Systems 3+0 7.5
Switched Dynamical Systems: Switching signals, Switching sequences, Solutions of switched linear systems; Stability, Asymptotic stability, Exponential stability, Lyapunov theorems; Common Lyapunov Functions: Common quadratic lyapunov functions, Switched quadratic lyapunov functions, Piecewise quadratic lyapunov functions, Multiple lyapunov functions; Stabilization of Switched Systems: Quadratic stabilization of switched systems, Piecewise quadratic stabilization of switched systems.

MAT625 Generalized Functions 3+0 7.5
Test and Generalized Functions : Introduction; Space of test functions; Space of generalized functions; Support of generalized functions; Regular and singular generalized functions; Sohotskii formula; Change of variables; Product of generalized functions; Derivative of Generalized Functions: Properties of generalized derivatives; The antiderivative of generalized functions; Convolution of Generalized Functions : Direct product of generalized functions; Definition of convolution; Regularization of generalized functions; Newton potential and examples of convolution; Slows Growing Generalized Functions: Space of functions S; Space S? Examples of slowly growing generalized functions; Fourier Transform : Fourier transform of functions from S; Fourier transform of functions from S? Properties of the Fourier transform of generalized functions; Examples; Fundamental Solutions : Fundamental solutions of linear differential operators; Notion of fundamental solution; Fundamental solutions of heat operator; Wave operator; Laplace operator and Helmholtz operator; Wave potential; Propagation of waves; Cauchy problem for the heat equation.

MAT626 Boundary Value Problems 3+0 7.5
Boundary Value Problems for Elliptic Equations: Eigenvalue problems; Sturm-Liuville problem; Harmonic functions and their properties; Fourier's method for eigenvalue problems; Newtonian potential; Boundary value problems for Laplace and Poisson equations in space; Green's function for Dirichlet problem; Boundary value problem for Laplace equation in the

plane; Mixed problems: Fourier's method; Mixed problems for hyperbolic equations; Mixed problems for hyperbolic equations; Mixed problems for parabolic equations.

MAT627 Antagonistic Differential Games 3+0 7.5

Minimax Control Problems; Positional Strategy; Motion of the system; Quality criterion; Two person differential game; Game problem of Approach and Evasion; Local Estimation; Extremal positional strategy; Existence of the alternative; Existence of the value of the positional differential games; Bellman-Isaacs equation; Viscosity solution of the Hamilton-Jacobi equation and value function of the differential game;Unification of differential.

MAT628 Rings and Radicals 3+0 7.5

General Theory of Radicals; Rings with Descending Chain Condition: Nil and nilpotent; Descending chain condition; Ideals in nil semi-simple rings with D.C.C.; Central idempotent elements; First structure theorem; Second structure theorem; Simple rings; Radical properties; Rings with the Ascending Chain Condition: Relationship between A.C.C. and D.C.C.; Nil and nilpotent; Baer lower radical; Prime rings; Zorn?s lemma; Prime ideals; Subdirect sums; Semi-prime rings; Semi-prime rings with A.C.C.; The Jacobson Radical: Quasi-regularity; Semi-simple rings; Right primitive rings; Jacobson radical and general radical theory; Brown-McCoy Radical: G-regularity; G-semi-simple rings; Brown-McCoy radical and the general theory; Levitzki Radical: Local nilpolitic; Eight radicals and results.

MAT629 Complex Analysis 3+0 7.5

Review of Cauchy Formula and Some Results; Entire Functions: Zeros of Entire Funtions; Infinite Products; Weierstrass Formula; Order of an Entire Function; Analytic Continuation: Notion of Analytic Continuation; Analytic Continuation on a Chain of Domains; Analytic Continuation on a Curve Segment; Continuation of Functional Equations; Weierstrass Method; Riemann Method and Swhwartz Reflection Princible; Singular Points; Functions Defined in Terms of a Cauchy Kernel: Hölder Condition.

MAT630 Hardy-Hilbert Space and its Operators 3+0 7.5

Hardy-Hilbert space; Shift operator, invariant subspaces, Beurling's theorem, Inner and outer functions, Blaschke products, Singular inner functions, Structure of outer functions; Toeplitz operators, Basic properties of Toeplitz operators, Spectral structure of Toeplitz operators; Hankel operators, Bounded Hankel operators, Compact Hankel operators, Relation between Hankel and Toeplitz operators; Composition operators, Littlewood subordination theorem, Eigenvalues and eigenvectors of composition operators, Compact composition operators .

MAT631 Mathematics for Operations Research 3+0 7.5

Introduction to Convex Analysis; Vector Spaces; Basis, Matrices; Linear Transformations; Systems of Linear Equation; Eigenvalue and Eigenvectors; Positive Certainty; Convex Sets and Their Topological Characteristics; Hyper Planes; Polyhedron Sets; Cones; Separating and Supportive Hyperplanes; Extreme Points and Directions; Convex Functions; Continuity and Differentiability of Convex Functions.

MAT632 Complex Geometry 3+0 7.5

Complex Structures and Holomorphic Maps; Almost Complex Manifolds: Integrability, Nijenhuis tensor field; Complex Manifolds: Complex vector fields, Differential forms; Connection in Almost Complex Manifolds; Hermitian Manifolds; Hermitian metrics, Kaehler Manifolds; Kaehler metrics, Kaehler form, Curvature tensor, Ricci tensor, Ricci form, Kaehler Metrics in Local Coordinate Systems; Examples of Kaehler Manifolds.

MAT633 Measure Theory and Integral 3+0 7.5

Measurable Space and Measure Space; Borel Measurable Sets; Regular and Radon Measure; The Jordan and Hahn Decompositions of Measure; The Saks, Alexandrov and Caratheodory Theorems; Measurable Functions; Egorov and Luzin Theorems; Integral of Simple Functions and Integral of Measurable Non-Negative Valued Functions; Bochner Integral; The Lebesgue and Radon ? Nikodym Theorems,;The Banach space , ; Riesz representation of continuous functionals defined on the space of continuous functions; Topological conjugate of the space of continuous functions.

MAT634 Compactness Theorems on Riemannian Manifolds 3+0 7.5

Metric Stucture on Riemannian Manifolds; Riemannian Metric Tensor; Length of a Curve; Distance between Two Points; Geodesics; Completeness of a Riemannian Manifold with Respect to a Metric; Definition of the Segment Between Two Points; Calculus of Variations and Compactness Theorems on Riemannian Manifolds; Laplace Comparison Theorems and Compactness Theorems on Riemannian Manifolds.

MAT635 Graph Theory 3+0 7.5

Graphs: Basic definitions, Trees, Counting trees and Cayley's Theorem; Planarity: Planar graphs, Euler Formula, Kuratowski Theorem, Graphs and planarity; Colouring Graphs: Colour-ing vertices, Brooks Theorem, Chromatic polynomials, The four-colour theorem, Colouring edges; Digraphs: Orientations, Directed Euler trails; Ramsey Theory: The graphical case of Ramsey's Theorem, Bounds on Classical Ramsey numbers, The general case of Ramsey's Theorem; Flows

in Networks: Transportation networks and flows, Maximal flows, The max flow min cut theorem and algorithm, Supply and demand problems; Some Graph Algorithms: Data structures, Some graph algorithms.

MAT636 Asymptotic Solutions of Differential Equations 3+0 7.5

Matched Asymptotic Expansions: Outer solution, Boundary layer, Matching, Composite solution, Transcendentally small terms, Interior layers, Corner layers; Multiple Scales Expansions: Regular Expansion, Multiple-scale expansion, Forced motion near resonance, Weakly coupled oscillators, Slowly varying coefficients, Boundary layers; WKB and Related Methods: Turning points, Wave propagation and energy methods, Wave propagation and slender-body approximations, Ray methods.

MAT637 Fuchsian Groups 3+0 7.5

Hyperbolic Geometry: Hyperbolic metric, Geodesics, İsometries, Hyperbolic area and The Gauss-Bonnet Formula; Fuchsian Groups: The PSL(2,R) group, Discrete groups, Algebraic properties of Fuchsian groups; Fundamental Regions: The Dirichlet region, Isometric circles and Ford fundamental region; Geometry of Fuchsian Groups: Geometrically finite Fuchsian groups, Co-compact Fuchsian groups.

MAT639 Differentiol Topology 3+0 7.5

Topological Manifolds, Differentiable Manifolds, Manifolds with boundary, Vector bundles, Fibre bundles, Sard's Theorem, Imbedding theorems, Homotopy and Stability, Dynamical systems, Isotopies, Transversality, Tubular Neighborhoods, Degree of a map, Euler Character-istic, Intersection number, Winding number, Lefschetz fixed point theorem, Poincare-hopf Theorem, Morse functions, Regular levels, Connected sum of manifolds, Classification of surfaces.

MAT641 Asymptotic Approximation of Integrals 3+0 7.5

Properties of Mellin Transforms: Works of Handelsman and Lew, Explicit error terms, A double integral; Distributional Approach: The Stieltjes transform, An oscillatory case, Hilbert transform, Laplace and Fourier transforms near the origin, Fractional integrals, Method of regularization; Uniform Asymptotic Expansions: Saddle point near a pole, Saddle point near an endpoint, Coalescing saddle point, Laguerre polynomials, Legendre function.

MAT643 Introduction to the Theory of Elastic Waves 3+0 7.5

Fundamental Waves of Elastodynamics and Their Representations: Fundamental body waves, Time harmonic body waves, Solution of boundary-initial value problems, Cauchy problems; Reflection and Refraction of Time Harmonic Waves at an Interface: Reflection of P and SV waves, Reflection of SH waves; Time Harmonic Waves in Elastic Waveguides: Waves in infinite plate in plane strain, Mixed conditions on plate faces, Love waves; Transient Waves in an Elastic Half Space: Plane strain problems, Lamb's problem, Axially symmetric problems.

MAT645 Fractional Differential Equations I 3+0 7.5

Special Functions of the Fractional Calculus: Definition of Gamma, Beta, Mittag-Leffler and Wright functions and some properties; Fractional Derivatives Operator: Grünwald-Letnikov, Riemann-Liouville, Caputo and Riesz fractional derivative operators and some properties; Solutions of Fractional Differantial Eqautions: Laplace, Fourier and Mellin transform methods for the solutions of fractional differantial equations.

MAT646 Fractional Differential Equations II 3+0 7.5

Existence and Uniqueness Theorems of the Linear Fractional Differential Equations: Linear fractional differential equations, Existence and uniqueness theorem; Fractional Green Functions: Definition and some properties; Power Series Method For the Fractional Differential Equations: One-term euation, Equation with non-constant coefficients, Two-term non- linear equation; Numerical Solutions of the Fractional Differential Equations: Initial conditions, Examples of numerical solutions; Fractional Differential Equations Systems and Solutions: Fractional-order systems, Examples.

MAT647 Algorithmic Graph Theory 3+0 7.5

Introducing Graphs and Algorithm Complexity: Introducing graphs, Introducing algorithmic complexity, Introducing data structures and depth-first searching; Spanning-Trees: Finding minimum spanning tree, Enumeration of spanning trees; Planar Graphs; Matchings; Eulerian and Hamiltonian Tours: Finding eulerian circuits, Postman problems, Hamiltonian tours, Existence theorems, The travelling salesman problem; Coloring Graphs: Dominating sets, Independence and cliques; Graph Problems and Intractability; NP-Complete Problems: Independent set and clique, Hamiltonian paths and circuits and the travelling salesman problem, Problems concerning the coloring of graphs.

MAT649 Near-Rings 3+0 7.5

The Elemantary Theory of Near-Rings: Fundamental definitions and properties, Constructions, Embeddings; Ideal Theory: Sums, Chain conditions, Decomposition Theorems, Prime ideals, Nil and nilpotent; Structure Theory: Types of n-groups, Change of the near-ring, Quasiregularity; Primitive Near-Rings: 0-primitive near-rings, 1-primitive near-rings, 2-primitive near-rings; Radical Theory: Jacobson-type radicals; Distributively Generated Near-Rings.

MAT651 Chotic Dynamical systems in Higher Dimensions 3+0 7.5

Chaos Conditions in Metric Spaces: Sensitive depence on initial conditions, Topological conjugacy, Periodic points; Chaos Conditions in Product Spaces; Dynamics of Linear maps: Behavior of linear maps, Stabil and untabil subspaces; Complex and Quaternionic Suqaring maps; Arnold's cat map; The Horseshoe map: Symbolic dynamics; Hyperbolic Toral Automorphisms: Markov partitions; Atractors; Bifurcations: Hopf bifurcations; The Henon map.

MAT692 Seminar 3+0 7.5

MAT790 Thesis 0+1 30.0

MAT890 Thesis 0+1 30.0

MAT890-0 Thesis (Thesis Proposal) 0+1 30.0

MEK501 Advanced Soil Mechanics 3+0 7.5
Soil Structure; Hydraulic Conductivity: Permeability and seepage; Stresses in Soil Mass: Two-dimensional problems and three-dimensional problems; Consolidation Theory: Settlement analysis; Theory of Shear Strength; Bearing Capacity of Shallow Foundations; Stability of Slopes; Theory of Lateral Earth Pressure; Soil Improvement: Grouting, Jet grouting.

MİM501 Analysis in Architecture 3+0 7.5
The Concept of Place and Space in Architectural Design; The Special Form of House; Perception; Definition of the Visual and Special Elements; In Connection With Cultural and Environmental Characteristics; Meaningful in the Architecture; Agenda of the Concept Studies; Scientific Researches and Reflection to Architectural Design; The Scaling Problem in Architecture; Components of Space and Place; Conceptual, Graphical, Typological and Algorithmic Techniques.

MİM502 Criticism in Architecture 3+0 7.5
Criticism in Architectural Design; Descriptions and Methods; Relationships of the Criticism/ Evaluation; Architectural Design; Criticism and Structure of the Criticism; The Criteria Developing in Architectural Design; Selection and Hierarchy of Criteria; Formation of Conceptual and Instructive Criteria and Criticism in Architectural Education.

MİM503 Housing Problems and Policies 3+0 7.5
Historical Development of Housing Problem; Housing Problem of Developed Countries; Housing Problem of Developing Countries; Housing Problem of Turkey; Housing Demand and Factors Affecting the Demand; Housing Policies of Developed and Developing Countries; Basic Principles of Housing Policy in Turkey and Results of Implementation of Them.

MİM504 Qualitative Values of Housing Areas 3+0 7.5
Concept of Quality in Housing Areas; Basic Determinants of Forming a Dynamic Environment in Mass Housing Areas by Considering Social Aspects; Comfort Conditions Depending on Variables of Physical Environment; Physical; Aesthetics; Visual and Social Parameters Which Form Quality Concept; Analysis of Housing Environment in Terms of Social and Technical Infrastructure; User Demands; Problems Related to Quality of Housing Environment.

MİM505 Ecological Planning and Design 3+0 7.5
Fundamental Ecologic Principles and Terms; Hybrid and Active Energy Design; Production and Protection of the Energy Planning of the Electric Production; Manipulation and Protection for the Sun; Heat and Wind; Protection for the Water Resources; Ecological Infrastructure of Some Countries; Pollution and Environmental Health; Protection of Fauna and Flora; The Difference Between Natural and Artificial Planning; Plants for Determining Environmental Quality; The Methods for Plants Protection.

MİM509 Legal Aspects of Urban Planning 3+0 7.5
Design and Realization Processes of Urban Plans; Laws and Regulations Concerned in the Process of Urban Design; Critical Review of Laws and Regulations in Effect; New Approaches to Urban Design Process; Environment Responsive Urban Design.

MİM511 Building Material Failures 3+0 7.5

Definition of Material Damage; Main Causes of Building Material Damage; External Causes of Damage (Climatic, Biological, Causes And Natural Disasters); Internal Causes of Damage And Man-Made Causes of Damage; Building Material Damages And Classification; Corrosion of Metals And Alloys Such As Iron, Copper And Lead; Degradation of Organic And Polymeric Materials Such As Wood, Paper, Leather, Wool, Cotton And Synthetics; Degradation of Inorganic Materials Such As Natural Stone, Brick, Glass, Concrete, Reinforced Concrete And Plaster.

MİM512 Administrative and Legal Aspects of Planning 3+0 7.5

Centralization and Decentralization : Definitions; Advantages and Disadvantages; Comparison; Local Governments in Turkey; Municipalities and its Administrative Units , Tasks, Problems and its Reorganization; Administrative and Implementation problems; Regulations and Problems of Urban Planning.

MİM513 Computer Programming and Introduction to Architectural Practices 3+0 7.5

Computer Graphics Design and Its Terms; Operating Systems; Modeling; Animation; Different Techniques of Virtual Realty; Artificial Intelligent- Expert Systems; Multimedia; Analysis of Different Computer Program; PASCAL Programming Language and Architectural Practices.

MİM514 User Interface Design 3+0 7.5

Introduction to GUI, History of Human- Computer Interaction; Interface Design and Methodologies; Computer Practices; The Principles of Interactive Communications Deal With Computer Technology and Interface Design; Techniques and Program.

MİM515 Solar Energy in Architecture 3+0 7.5

Historical Development of the Relation Between Solar Energy and Building Design; Why Solar Architecture?; The Role of Sun; In the Space Comfort; The Possible Active and Passive Uses of Solar Energy; The Basic Elements and the History of Passive Use; Solar Windows; Solar Walls; Green Houses; The Active Use of Solar Energy; Solar Collectors; Photovoltaic Modules; The History; Development; Construction; Specialties of Pvs and their Use in Architecture and Examples.

MİM516 Building Shell Design in Energy Efficient Buildings 3+0 7.5

The Reasons of Energy Efficiency; Why Renewable Energy Sources; The Energy Efficiency Period; The Design Parameters of Artificial Environment; Place; Orientation; Form; Thermo-Physical Properties; Wall Constructions in the Aspect of Energy Efficiency and Climatic Comfort: Heat Isolation; Storing Heat; Heat Transfer on the Wall Construction; Convection; Conduction; Radiation; Passive Buildings; Low-Energy Building; Zero-Energy Building; Plus-Energy Building Concepts; The Design Principles of Energy Efficient Buildings and the Trend in 21st Century.

MİM517 Architectural Precast 3+0 7.5

Precast Concrete and Advantages of Precast Concrete; Design Concept in Terms of Economy and Usage; Design Evaluations; Product Development; Shape; Form and Dimensions; Color and Texture; Weathering; Structural Design; Hoisting and Transportation; Tolerance; Jointing; Detailing; Application Drawings; Surfaces; Weathering Details; Fixings; Jointing; Joints.

MİM518 Structure in Architecture 3+0 7.5

Structure and Architecture; Structural Design in Architecture; Relationship Between Architectural and Structural Design; Steel Structures; Selection Criteria; Steel Components; Structural Forms; Reinforced Concrete Structures; Selection Criteria; Concrete Technology; Structural Forms; Masonry; Structures; Timber Structures; Selection Criteria; Timber Components; Structural Forms.

MİM519 Housing Architecture 3+0 7.5

Type and Typology Concepts; Development of Housing Typology in Historical Perspective; Shelter and House Concept; Effects of the Industrial Revolution on Housing Planning; Housing Spaces in Utopias; Approaches to Housing in the Understanding of Modernism; Development of the House in Turkey and the World; The Role and the Needs of the Occupant in Housing Planning; Traditional House and the Turkish House; The Turkish House; Planning Principles; Rooms; Facade Elements; Styles, Interpretation of the Turkish House in Today's Conditions.

MİM520 Architectural Steel 3+0 7.5

Structural Steel in Architecture; Steel Production and Steel Products; Development in Steel Structures; High-Rise Steel Structures; Design and Application Criteria for Steel Structures; Basic Planning Problems; Columns; Wind Bracings; Flooring Structures and Applications; Constructional Elements; External Walls; Roofs; Fire Prevention; Corrosion and Prevention.

MİM521 Environmental Design 3+0 7.5

Environmental Design; Perceiving and Environmental Perception; Theories and Researches; Environmental Cognition and Perception; Theories; Researches; Design and Cognitive Studies; Environmental Behavior; Behavioral Settings; Patterns of Act; Fit and Fitness; Researches; Behavior and Design; Space; Personal Space; Proximity Theory; Researches; Space and Design; Proximity; Intimate; Theories; Territoriality; Defensible Space; Intimate and Design; Environmental Stress; Theoretical Approach; Ecological Fitness.

MİM523 Contemporary Interpretation of Traditional Turkish Houses 3+0 7.5

Primitive Living Spaces, Sheltering Conception of Turkish Society, Differences Between Nomed Period and Settled Period, Rural and Urban Houses, Turkish House Space Configuration, Turkish House and Regional Diversity, Plan, Function, Elevation Formations, Material, and Decorate about Turkish House; Analysing a Turkish House in Contemporary Life.

MİM525 Culture, House and Identity 3+0 7.5

Sheltering; Housing and Mass Housing Concept; Shaping Development from Utopia to Present; The Relationship between Culture; Identity Concept and Housing Space; Approaches for Environmental Behavior on House Based Studies; Cultural Factors Affecting the Process of Shaping Housing Environment in Different Levels; Culture; House and Identity Components in the Settlements in different Cultures.

MİM526 Computer Aided Architectural Analyses Techniques 3+0 7.5

Information Systems; Spatial Information Techniques; Computer Aided Design Applications; 3D Modeling; Computer Aided Architectural Analyses Techniques; Preparation Base Maps with High Resolution Satellite Images; Visualization Techniques; Topographical Analyses; Overlay; Interpretation Techniques.

MİM528 Using of Space around House and House Environment 3+0 7.5

The Relationship between Environment , House and Mass Housing; Shaping Housing Area; Design of Housing Indoor and Outdoor Space: Micro climatic components, Physiological Environment components, Indoor and Outdoor Landscape, Livable Housing Environment, User needs; Quality in Housing Environment, Usability of Housing Environment; Post Occupancy Evaluation; Studying and Evaluation of the Alternative Housing Layout according to Environment; House and User.

MİM529 Urban Space and Handicapped People 3+0 7.5

Planning Approaches for Healthy Cities; Features of the City; Urban Rights and Dependency; Handicapped People in the City; Urban Environment and Handicapped People; Accessibility in Urban Space; Urban Design for Everyone; Applications, Problems and Solutions; Handicapped Persons and Laws.

MİM530 National and International Aspects of Urban Conservation and Renewal 3+0 7.5

The Reasons for Conservation of Historical Environment and Renewal; Historical Development of Conservation and Renewal Awareness in National and International Levels; Context and Concept of Conservation of Historical Environment and Renewal in National and International Level; Actions and Fundamentals of Conservation of Historical Environment and Renewal; Legislative Aspects of Conservation of Historical Environment and Renewal; The Tasks and Authorizations of the Conservation and Renewal Agencies.

MİM531 Architectural Design Methods 3+0 7.5

Architectural Design and Process: Creativity, Analysis, Concept, Definition of the problem; Logic of Design and Methods: The role of perception, The originality of design and expression; The Approaches in Architectural Design; Participatory and Sustainability Design: The problem of place in architectural design, Contemporary Concepts and Evaluation of Environmental Problems: Cultural and historical design.

MİM532 Urban Regeneration 3+0 7.5

National and International Scope of Urban Regeneration; Urban Development Processes and Regeneration Practices; Historical Formation and Structure of Urban Space; Social and Demographic Development Processes in Urban Spaces; Economic Development Processes; Physical Development Processes in Urban Spaces; Formation of the Urban Culture and Its Effect on Urban Space

MİM533 Methodologies in Architectural Design Research 3+0 7.5

Methodologies In Architectural Design Research, Description of the Concept of Research, Various Approaches, Researches and Techniques; Research Problems in Architectural Design: Description, Planning, Content and procedures, Stating hypothesis, Strategies, Methods and techniques of data gathering, Data analyzing, Hypothesis testing; Tools for Environment-Behaviour Research; Problems of Reliability and Validity in Research, Qualitative and Quantitative Methods; Communicating the Research for Scientific References: Techniques of writing scientific documents.

MİM534 Designing of Housing Areas 3+0 7.5

Problems Related to Mass Housing Construction and Alternative Solutions for Design Principles; Housing Problem and Its Indicators; Housing Policy Indicators; Housing Policies and Housing Systems in Turkey; Physical, Natural and Social Environmental Factors Related to the Location and Site Planning of Residential Areas; Residential Densities; Housing Types Environmental Factors in Housing Design.Problems related to Design of Housing Areas in the Modern Age; Analysis and Evaluation of Mass Housing Applications in Turkey and the World.

MİM535 Urban Design Theory 3+0 7.5

Space, Definition of Urban Space and its Content; Elements of the Urban Pattern: Theories, definitions, man and urban space relations; Sensual Evaluation Systems; Visual perception Action Patterns; Urban Space and User Qualities, Characteristics of the Social, Economic and Cultural Structures, Theories of the Urban Space Design: Decision theory, Perception theory, Theories which bring formal approach and evaluation to the space; Sociological Theories and Ecological Design Theories.

MİM536 Rationalism in Architecture 3+0 7.5

Concept of Rationalism; Rational Architecture in the Ancient Egypt, Ancient Greek and Ancient Rome; Rational Architecture in Renaissance; Rationalism and Rational Architecture in the Enlightenment Period; Structural and Functional Rationalism; Rational Architecture in the Early Modern Architecture; Bauhaus and its Rational Sources; Rational Architecture after the World War II; Rationalist Reactions to Rationalism; Alternative Meanings of Contemporary Rationalism: Neo-Rationalism (Post-modern rationalism), Surrationalism; Rationalism in Turkish Architecture.

MİM541 Architectural Design Studio I 2+4 7.5

Architectural Design Education: Architectural design processes, Architectural design methods; Current Aspects of Architectural Design: Research on global architecture and regional and local architecture, Data collection and analysis, Developing projects as a solution; Responsibility in Architecture; Key Points in Architectural Design: Function, Firmness and Aesthetics; Use of Technology in Architectural Design Process.

MİM543 Building Material Experiments 3+0 7.5

Conventional and Composite Building Materials; Natural stone, Brick, Tile, Ceramic, Natural and artificial wood, Plaster, Mortar, Reinforced concrete, Metal, Rubber, Bitumen and polymers; Physical, Chemical and Mechanical Features of Materials; Effects of Atmospheric Factors on Building Materials, Effects of Various Chemicals and Internal and External Factors; Analogue and Digital Test Equipment Used in the Measurements of Damage, Deformation and Physical Changes of Materials; Measurements and Analyses of Changes on Physical, Chemical and Mechanical Features of Materials and Use of Analogue and Digital Test Equipment for the Measurement and Analyses of Apparent or Unapparent Damage and Deformation Mechanisms in Materials.

MİM544 Architectural Design and Criticism 3+0 7.5

Architectural Design and Criticism: Theoritical Framework; the Architect, and Architecture as a Cultural Product; Architectural Criticism and Architectural Agenda; Architectural Criticism in Architectural Design; Architecture and Autonomy; Criticism as a Tool for Architectural Design Research; Criticism in Private and Public Space; Architectural Criticism in Understanding the City; Current Architectural Trends and Architectural Criticism; Mediatization of Architecture; Evaluation of Cultural and Historical Phenomena through Critical Readings.

MİM545 Architecture Sociological Readings 3+0 7.5

Sociological Understanding of Architecture; Sociological Research; Evaluation of the Society from a Historical Perspective; National and International Status of the Architectural Profession; Sociological Components: Historical awareness, Anthropological and critical perpectives; Responsibility Towards Society and the Built Environment; Architecture and the Phenomenon of Society; Ideology and Power Theory; The French Revolution, the Industrial Revolution, Relationship of Capitalist Production with Modernity and Nation-States; Modernist and Postmodernist Sociological Approaches.

MİM546 Readings of Modernity in the Context of Architecture 3+0 7.5

Discipline of Architecture, Historical Definitions and Confines; Pre-Modernism, Late 19th Century Period Characteristics; Introduction to Modernity: Emergence of Modernity and Characteristics of the Period; Modernist Positions: Modernity and avant-Garde; Modernity and Art; Modernity and Architecture (I); Modernity and Architecture (II); Modernity and Architecture (III); Modernity, City and Spaces of Interaction.

MİM547 Architecture Communication 3+0 7.5

Architectural and Interior Design in Organization of Enterprises; Thinking on Architecture, Communication and Organizations and Conceptual Frameworks; Power of Spatial Relationships; Decision Making by Administrators and Architects in Consideration of Strategic Spatial Planning and Business Needs; Field Studies and Examples; Message Given by Successful Spatial Design to Clients and Business Partners; Impact of Communication and Spatial Design on on Business Efficiency and Effectiveness.

MİM549 Accessibility 3+0 7.5

Built-up Environment and Users, Mobility and Accessibility: Accessibility of travelling, Pedestrian spaces, Transportation space and vehicles, Accessibility as a Right: International legislation, National legislation, Accessibility of the Built-up Environment: Architectural space, Urban space, Urban landscape, Design and accessibility for everyone, National and international norms and standards, Accessibility practices and problems, Accessibility and legal conditions.

MİM553 Auditorium Acoustics 3+0 7.5

Basic Information of Room Acoustics; Sound Level in Enclosed Spaces; Direct and Reverberant Sound Levels; Early Reflections and Their Effects; Parameters of Room Acoustics; Requirements Related to Parameters; Measurements Related to Parameters; Acoustical Design of Rooms; Determining Dimensions of the Room; Acoustic Defaults and Precautions in Rooms; Designing Interior Surfaces of Rooms and Selection of Materials; Practices of Architectural Acoustics in Sample Projects.

MİM554 Digital Design and Production in Architecture 3+0 7.5

Digital Design Concept: The history and use of computers in architecture, Virtual-Real Real-Virtual Digital Fabrication: The history of digital manufacturing, Additive, Subtractive, Forming; Prototypes: Alpha and beta, Prototypes in architecture; Material: Geometry and dimension of materials, The relation of materials and fabrication; Digital Tectonics in Architecture: Sectioning, Tessellation, Folding, Contouring, Forming, Assembly; Digital Design in Architecture: Parametric, Performative, Interactive; Digital Design and Form: Blob, Metamorphosis, Genetic; Strategies and Tools: Software, Fabrication, Algorithmic design and coding; Rhinoceros and Grasshopper.

MİM555 Immaterial Architecture and its Elements 3+0 7.5

Basic Arguments and Discussions about the Concept of Material; Evolution of the Concepts of Material and Idea Throughout the History; Explanation of Arguments Related to Material and Memory from the Perspective of Bergson's Philosophy of; Arguments and Explanations Related to the Concepts of Material and Immateriality; Concept of Immateriality in Architecture; Immaterial Elements in Architecture; Immaterial Elements in Architecture and Contemporary Information Technology.

MİM557 Design Principles of Room Acoustics 3+0 7.5

Sound Field Differences Between Open and Enclosed Spaces; Sound Level in Enclosed Spaces; Frequency Response; Subjective and Objective Room Acoustics Parameters; Sound Reflective, Diffuser and Absorptive Surfaces; Combined Space; Presence Effect and Practices on Presence Effect; Acoustic Design Principles of Rooms for Speech; Acoustic Design Principles of Rooms for Music; Acoustic Design Principles of Multi-Purposed Rooms; Use of Computer Modeling in Room Acoustics.

MİM559 Noise Control I 3+0 7.5

Basic Principles of Sound; Noise and Noise Sources; Effects of Noise on Human and Community; Noise Control and Basic Principles; Regulations and Standards on Noise Control; Physical Events Related to Sound; Airborne Sound and Structure Borne Sound; Propagation of Sound; Environmental Factors on Propagation of Noise; Sound Reflection and Absorption; Importance of Sound Absorptive Materials on Noise Control; Basic Principles of Sound Transmission; Practices on Sound Transmission Loss Calculations; Sound Level and Sound Insulation Measurements.

MİM560 Noise Control II 3+0 7.5

Sound Transmission and Noise Control; Sound Reduction on Single, Double or Multiple Layered Building Components, Calculations and Applications; Airborne and Structure-Borne Noise Insulation for Building Components; Basics of Vibration Sources in Buildings and Related Precautions; Outdoor Sound Propagation; Noise Barriers and Calculation Techniques; Computer Simulations and Applications Related to Urban and Building Acoustics.

MİM561 Architectural Design Studio I 2+2 7.5

Architectural Design Education: Architectural design processes, Architectural design methods; Current Aspects of Architectural Design: Studies on global architecture, Research on regional subjects, Data collection, Analysis, Developing projects/solutions; Responsibility in Architectural Design; Key Points in Architectural Design: Function, Firmness and Aesthetics; Use of Technology in Architectural Design Process.

MİM562 Architectural Design Studio II 2+2 7.5

Theory and Applications in Architectural Design; Architectural Examples from the Local to the Global; Approaches to Architectural Design: Scientific research, Design methods; Interpretation in Architectural Design; Methods of Using Architectural Technologies; Current Architectural Issues Related to Economic and Environmental Responsibilities in Design.

MİM565 21st Century Approaches in Architectural Design 3+0 7.5

The Contemporary Parameters of Architectural Design and the Design Studio; Design Thinking; Relating the Concepts of Creativity with Architectural Design Studio; The Contemporary Design Tools and Digital Architectural Productions; Distanced Architectural Design Education; Production of Knowledge in Studio; Research by Design; Technology, Image, and Representation for Architectural Design; Re-defining the Design Pedagogies; Re-defining the Body-Space Relation in Architecture; Ethical, Social and Environmental Concerns for a Holistic Design Process.

MİM571 Advanced Human Factors in Aviation 3+0 7.5

Biomechanics and Anthropometry; Posture and Movement; Calculation Methods of Limit Values in Lifting and Carrying Load; Shift Works in Aviation; Fatigue and Absenteeism; Basic Approaches for Job Motivation and Employee Productivity; Organizational Human Factors; Cognitive Human Factors; Situational Awareness in Aviation; Aircraft Accidents and Literature Studies on Human Factors in Aviation.

MİM573 Design Process Approaches in Intersection of Architecture and Architecture Education 3+0 7.5

Interaction of Architecture Profession and Architecture Education; Architecture Design and Architecture Design Process; Stages of Architectural Design Process, Different Approaches in Architectural Design Process; Design Process Models that efficient in Architectural Design; Design Process Approaches in Architecture Education Ecoles; Design Process Approaches in the Revolutionary Education Models of Architectural Education; Current Design Process Approaches of Architectural Education; Designing the Architecture Design Process**.**

MİM592 Seminar 3+0 7.5

MİM601 Architectural Studio Research I 3+0 7.5

In architecture, to bring together different areas in the basic idea of the systematic design; To ensure the cooperation interdisipliner with exchange and communication with other disciplines; To do research on and develop upon to produce and to win the community the best qualified information that can be transferred to practice.

MİM602 Architectural Studio Research II 3+0 7.5

In the field of architecture to search configuration of to craeate of global warming, climatic changes, technology and scientific approaches; Depending on the research the future of an experimental project preparation, to work and development of innovative works in theoretical and practical architectural design fields by coming together in the interdisciplinary and the experimental environment.

MİM603 Architectural Research Methods 3+0 7.5

Domain of Architectural Research: Systems of Inquairy and Standards of Research Quality, Literature Review, Theory in Relation To Method, Design in Relation To Research; Seven Research Strategies: Interpretive-Historical Research, Qualitative Research, Correlational Research, Experimental and Quasi-Experimental Research, Simulation and Modelling Research, Logical Argumentation, Case Studies and Combined Strategies.

MİM604 Architecture: Art, Science and Technology 3+0 7.5

Architecture: Art, Science and Technology, Design; Interdisciplinarity, Design Process, Built-in Environment, Construction, Anesthesiology, Esthesiology, Live Art Performance, Benefits Of Society/User/Architect, Theory and Applications, Case Study.

MİM605 Sustainable Architecture 3+0 7.5

Principles of Sustainability, Strategic Design, Ecology, Recycled Building Materials, Eco Building Materials, Lowtech Housing, Hightech Housing, Passive and Active Sustainable Design.

MİM606 Urban Space Design Quality 3+0 7.5

The definition of urban space, the analysis of urban space form, the determination of user- urban space relationship, the user needs and requirements for urban space, the definition of quality, relationship between architecture an quality, urban space quality indicators, the analysis of well-done examples urban space.

MİM607 The Tools and Quality Measurement Methods for Design 3+0 7.5

Definition of design, architecture and design, architectural space, theories of perception, spatial perception and comprehension, spatial quality theory, space is associated with quality measurement methods, quantitative and qualitative measurement techniques in architectural design classification, use of quality indicators measurement method, weighting (multiple criteria method) method of valuation, integrated method, examples of quality measuring tools.

MİM613 Civic Space and Buildings 3+0 7.5

Study on the terminology of "Civic space" and "civic buildings"; Case studies on public and civic spaces such as agora, forum, square, place, plazza, public parks, hippodromes or stadiums, and public parks; significant examples of bureaucracy and cultural institutions such as the parliament, justice buildings, university, theatre, opera, concert hall, academies and art buildings; emphasizing on the twentieth century buildings and capitals.

MİM614 Health Impact Assessment of Space 3+0 7.5

The definition of health and well-being, Physical health, Mental health and well-being, Social health and well-being for open space; The typology of open spaces, according to their function and strategic importance; local and neighbourhood differences; parks: private gardens; natural and semi-natural greenspaces; green corridors; play space for children and teenagers; amenity greenspace; and, other functional greenspaces.

MİM615 Spatial Relationships and Architecture 3+0 7.5

Evaluation Physical Environment and Place: Interdiciplinary different approaches and different readings, Historical and cultural continuity concepts and contributions of historical process to spatial reading, Requirements of multi-aspect readings of spatial relationship; Spatial Relationships and Spatial Continuity: Different dimentions of spatial relationships, Concepts of spatial continuity and interface on different scales, All interfaces from scale of the city to the interior spaces as a place; Importance of Spatial Continuity and Concept of Integrated Design: Use of visual meterials, Case studies with students.

MİM616 Bounderies of the House and Modernity 3+0 7.5

Home, House, Housing and Dwelling: Forces determining the house form: Physical Forces, Social Forces; House and its environment; Boundary and the House, Inside- Outside, Inside-inside relationships; Conditions of Modernity and the Change: House and its changing boundaries in first half of the 20th century, Analysis of the houses from Turkey and abroad.

MİM617 Architecture and the Morphological Study 3+0 7.5

The three existential world centers: SUB, OBJ, SEM, A model of fundamental triads, The fundamental triad of SUB, OBJ, SEM, Whitehead's view of the world as system of societies, The structural principle of the Gestalt method, Morphology: a cognitive approach to the general study of pattern, Goethe's morphology, The Kulturmorphologie movement, Cultural pattern stability, transmission, synchrony and diachrony

MİM618 History and Criticism of Contemporary Architecture 3+0 7.5

Modern Architecture I; Modern Architecture II; Modern City I; Modern City II; Postmodern Culture and Architecture I; Postmodern Culture and Architecture II; Trends in Contemporary Architecture I; Trends in Contemporary Architecture II; Trends in Contemporary Architecture III; Trends in Contemporary Architecture and Criticism IV; Effects of Contemporary Architecture on Turkish Architecture I; Effects of Contemporary Architecture on Turkish Architecture II.

MİM619 Contemporary PProjects in Sustainable 3+0 7.5

Analysis of Contemporary Projects on Sustainable Architecture; Definition and Ideas: Ecovillage, Architectural design approaches, Concept; Sustainable Development: Definition, Environmental issues and sustainability, Economic issues and sustainability, Social issues and sustainability; Technology, Project and Application; Research Fields: Sustainability, Sustainable architecture, Logic of investment on sustainability; National and Global Design Policies; National and International Network for Sustainability.

MİM620 Universal Design 3+0 7.5

Introduction to Universal Design; Design and Users; Universal Design/Design for All; Users of Universal Design: People with disabilities, People without disabilities, Elderly; Barriers and Universal Design; Principles of Universal Design; Accessibility as a Right; Accessibility to Products and Services; Accessibility to Built Environment: Indoor public facilities, Outdoor public facilities; Best Practices and Universal Design Guide; Policies Supporting Universal Design.

MİM621 Architecture and Housing 3+0 7.5

Housing: Definition, Concept, Architectural design process, Role of the architect, Design methodology; Housing Typologies: Single family houses, Detached type, Semi-detached type, Row houses, Terrace houses, Apartments: definitions, node apartments, star apartments, block apartments; Mass Housing: Definition, Housing for the elderly and

disabled, Lofts, Mobile homes, Youth hostels, Social housing: Definition and Projects; Research Fields: Building types, Housing, Mass-Housing, Affordable housing; Analyses of National Examples; Analyses of International Examples.

MİM622 Urban Acoustic Comfort 3+0 7.5

Basic Information on Sound and Noise; Propagation, Reflection and Absorption of the Sound Outdoors; Fundamental Factors in Noise Propagation; Ambient Noise and its Sources; Evaluation of Urban Acoustic Comfort (Objective and Subjective Evaluation Methods); Noise Measurements, Noise Maps and Simulations; Soundscape and Its Components; Design Principles for Urban Acoustic Comfort.

MİM623 Integrated Design Studio in Architectural Education 3+0 7.5

Architectural education; Teaching of architectural design; The views on architecture this teaching reflects; principles emerging through its implemented pedagogy; educational objectives; teaching strategies; methods and priorities; a specific framework of thinking: understanding and doing a digital design; a specific architectural paradigm. as lab or as studio: ‘integrated' or ‘vertical' of the teaching design; the decisive melting pot of architectural education; a framework of thinking, understanding and doing design.

MİM624 Integrated Design Studio in Architectural Education II 3+0 7.5

Architectural education; Teaching of architectural design; The views on architecture this teaching reflects; principles emerging through its implemented pedagogy; educational objectives; teaching strategies; methods and priorities; a specific framework of thinking: understanding and doing a digital design; a specific architectural paradigm. as lab or as studio: ‘integrated' or ‘vertical' of the teaching design; the decisive melting pot of architectural education; a framework of thinking, understanding and doing design; Conceptual: where the articulation and integration of architectural ideas take place, through experimentation, critique, confrontation, exchange, argumentation, debate or even imposition; the innovative, the experimental design technigues; the extended applications of digital technology.

MİM625 Current Issues in Contemporary Architecture 3+0 7.5

Complex architectural problems; Current research, representation, design problems and criticism; Cross-examination of contemporary architectural problems with related disciplines of architecture in different times, processes and contexts; Network transformations in the context of architectural object, city and region; The position of the architectural object in the future scenarios of the city and regional planning and its transformation with information technologies; The position of the architect within the framework of changes in today's architectural design paradigms.

MİM626 Contemporary Approaches İnarchitectural Design 3+0 7.5

Relational dimension of Architecture; Interdisciplinary interaction in Architecture; Current research topics in Architectural Design; Comparative perspective on practical and objective, theoretical and literary productions in Contemporary Architectural Design; Case study analysis: conceptual and methodical evaluation of related practical and objective productions; Case study analysis: conceptual, methodical and scientific contribution evaluation of the related theoretical and literary productions; Comparative evaluation of Contemporary Architectural Design Approaches and development of a methodological proposal for improvements and adaptations.

MİM628 Architecture and Intertextuality 2+0 7.5

Research, Explanation and Introduction of the Concept of Intertextuality; Intertextuality and Julia Kristeva; Intertextuality and Roland Barthes' New Perspective; From Post Structuralism to Deconstruction; Intertextuality and Jacques Derrida's New Perspective; Arguments and Letters of Derrida and Peter Eisenman; Intertextuality and Umberto Eco; Intertextuality and Creativity; Architecture and Intertextuality; Artwork and Architecture at the Intersection of Imitation, Copy, Reproduction and Interpretation.

MİM692 Seminar 3+0 7.5

MİM790 Thesis 0+1 30.0

MİM890 Thesis 0+1 30.0

MİM890-0 Thesis (Thesis Proposal) 0+1 30.0

MKM501 Advanced Heat and Mass Transfer 3+0 7.5

Introduction to Heat and Mass Transfer; Generalized Continuity Equations; One and Two-Dimensional Heat Conduction Mechanism and Formulations; Transient Heat Conduction; Introduction to Heat Convection, Non-dimensional similarities; Introduction to Boundary Layer and its Properties; Heat Convection Mechanism and Formulations; Heat Convection for Internal and External Flows; Natural Convection; Radiation Process; Mass Transfer and Diffusion; Similarities Between Heat and Mass Transfer.

MKM503 Academic Development 3+0 7.5

History of Science; Ethics and Typical Application Mistakes; How to Choose a Scientific Topic; How to Reach Scientific Information: Web of science, Google academic; How to Write and Present a Scientific Article; How to Prepare a Project: Problem analysis, Objective analysis, Strategy analysis, Method analysis: Originality: Impact; Points to Consider when Preparing a Presentation; Effective Oratory Techniques; Relationship between the Student and the Advisor; Laboratory Safety; Evaluation and Assessment.

MKM509 Machining Dynamics 3+0 7.5

Modelling Technics in Machining; Mechanistic and Analitical Cutting Models; Modal and Stractural Dynamic Anaysis; Modal Anaysis in Machine Tools and Tools; Development of Chatter Model: Chatter models for milling, Chatter models for turning; Dynamic Simulations; Dynamic Simulation Method in Machining with Using Finite Element Methods.

MKM511 Advanced C++ Programming 3+0 7.5

Introduction to Computer Programming; Program Development: Flow chart, Software, Compilation, Debugging; Data Types: Integer, Real numbers, Complex numbers, Characters; Operators and Expressions; Program Control Statements: If, Else, For, While; Arrays; Functions and Modeler Programming; Pointers; Class and Object Oriented Programming; Parallel Programming: OpenMP programming, MPI programming.

MKM513 Experimental Methods for Fluid Dynamics 3+0 7.5

Introduction the Experimental Techniques for Fluid Dynamics and Fundamental Terms; Critical Topics in Measurement Techniques; Steady State and Time Dependent Measurements; Pressure Measurement Methods; Temperature Measurement Methods; Optical Measurement System; Velocity/Turbulence/Flow Rate Measurement Methods; Measurement of Flow Angle; Advance Measurement Methods; Statistical Analysis of Experimental Data; Post Processing Techniques and Understanding of Measurement Results; Fourier Transformation; Cross Correlation of Data; Uncertainty Analysis.

MKM514 Atomistic Simulation of Materials 3+0 7.5

Introduction to Quantum Mechanics; Introduction to Quantum Mechanic Simulations: Hartree-Fock and density functional theory, Lattice constant of Si and C, Bulk modulus, Elastic constants and electronic band structure, Structural and electronic properties of C based nanomaterials; Introduction to Molecular Dynamics; Atomistic Potential Generation Techniques; Introduction to Molecular Dynamics Simulations: Lattice constant, High T properties.

MKM515 Renewable Energy Systems 3+0 7.5

Description and Historical Development of Renewable Energy Technologies Energy Sources; Hydraulic Energy and its Usage Principles; Hydraulic Energy Systems; Wind Energy and its Usage Principles; Wind Energy Systems; Solar Energy and its Usage Principles; Solar Energy Systems; Geothermal Energy and its Usage Principles; Geothermal Energy Systems; Fuel Cells; Analysis of Renewable Energy System; Evaluation of Renewable Energy Systems in Economical Way; Renewable Energy and Environmental Laws.

MKM516 Additive Manufacturing Methods 3+0 7.5

Additive Manufacturing: Basics of rapid prototyping, Reverse engineering and additive manufacturing; Methods and Materials in Additive Manufacturing: Additive manufacturing with fused deposition methods, Streolitography (SlA) method, Additive manufacturing with lamited object manufacturing, Selective laser sintering, Selective laser melting, Laser deposition systems; Metallic Additive Manufacturing Systems; Composite Additive Manufacturing; Biological Printing; Industrial Applications of Additive Manufacturing.

MKM517 Computer Aided Analysis 3+0 7.5

Introduction to ANSYS Simulation Software; Direct and Solid Modeling; Solution of a Variety of Mechanical Engineering Problems using ANSYS; Static Analysis of Beams and Plates; Static Analysis of Planar and Space Trusses; Temperature Effects ve Non-linear Examples; ANSYS Applications in Structural Analysis; ANSYS Applications of Free and Forced Vibrations; Solution of Contact Problems using ANSYS.

MKM518 Sustainable Manufacturing 3+0 7.5

Introduction to Sustainable Manufacturing; Sustainable Business and Production Models; Product Life Cycle Transformation of Production Systems; Product Life Cycle in Manufacturing; Green Manufacturing; Envoirement and Health in Manufacturing; Green Design in Engineering; Absence of Products: Recycle and life cycle of product; Business Models in Sustainable Manufacturing; Energy Efficiency and Decreasing of Energy; Modelling of Carbon Food Print in Manufacturing; Sustainability and Productivity; Effects of Social Factors in Manufacturing Systems; Operations in Sustainable Manufacturing, Tools and systems.

MKM519 Exergy and Entropy Analysis 3+0 7.5

Fundamental Thermodynamics Laws and Principles; Definition of Exergy and Energy; History of Exergy and Usable Energy; Exergy Balance and Exergy Losses; Exergy Efficiency of Thermal Systems; Thermodynamic Applications of Exergy Analysis; Exergy Calculations; Exergy Calculations in Open Systems; Physical and Chemical Exergy Calculations; Exergy Analysis of Typical Thermal Systems; Exergy Analysis of Combined Cycles; Exergy Analysis of Solar Collectors; Adiabatic Systems; Exergy of Steady State Flow Processes; Characteristics of Irreversible Systems and Processes.

MKM520 Computer Aided Engineering 3+0 7.5

Fundamentals of CAD/CAM/CAE and Introduction to Computer Aided Engineering Software; Introduction to CAD/CAM/CAE Systems; Engineering Processes in Design; Geometric Modeling in Engineering Applications; Numerical Methods in Engineering Design Systems; Solid Modeling; Numerical Methods in Structural Analysis; Introduction to Dynamic Analysis; Applications of Numerical Control Machining Systems; G-Codes; Applications of CAD/CAM/CAE Commercial Products in Engineering Projects.

MKM522 Mechanical Behavior of Materials 3+0 7.5

Classification of Materials and Properties; Elastic and Plastic Deformation; Stress and Strain Relationships; Hooke's Law; Von Mises Yield Criteria; Tresca Yield Criteria; Plastic Deformation; Factors Influencing Plastic Behavior; Strengthening Mechanisms; Ductile and Brittle Fracture; Yielding and Plastic Instability; Introduction to Linear Elastic Fracture Mechanics; Fatigue and Fracture; Influence of Environmental Parameters on Mechanical Properties; Fundamentals of Damage.

MKM523 Vehicle Systems Design 3+0 7.5

Introduction to vehicle dynamics, tires and their mechanics, drive-train model, braking stability, steering of vehicles, suspension kinematics and vehicle ride models. Design and specifications of brake systems, pneumatic and hydraulic brake systems, disc and drum brakes, elements of brake systems, auxiliary elements of brake systems, pneumatic tires and rims, design of suspension systems, sprrngs and dampers, steering wheel mechanisms. Vehicle design in Matlab - Simulink environment.

MKM524 Smart Materials and Applications 3+0 7.5

Definition of Smart Materials; Sensors, Actuators and transducers; Introduction to Different Types of Smart Materials; History and Industrial Applications of Smart Materials; Piezoelectric Materials: Crystallography, Crystal structure, Mechanism of piezolelectricity; Common Piezoelectric Materials; Superelasticity; Superelastic Materials Phase Transformation; Martensitic Transformations, Shape memory effect and superelasticity; Mechanical Behavior and Shape Memory Characteristics of Different Shape Memory Alloy Systems; Ti-Ni Phase Diagrams; One Way, Two Way Shape Memory Effect and General Applications.

MKM525 Superalloys 3+0 7.5

Introduction: Definition of superalloys and general concepts; Classification of Superalloys: Superalloy strengthening mechanisms; Properties of Superalloys: Physical properties, Mechanical properties, Thermal properties; Processing of Superalloys: Physical metallurgy and initial processing, Forming and machining, Final processing; Selection of Superalloys: Selection criteria, Example application.

MKM526 Advanced Powerplant System Technologies and Applications 3+0 7.5

Introduction; Thermodynamic Laws; The Rankine Cycle; Fossil Fuel Steam Generators; Fuels and Combustion; Turbines; Condensators and Pumps; Gas Turbines; Combined-Cycle Systems (Cogeneration and Trigeneration); Nuclear Energy and Nuclear Powerplant Systems; Geothermal Energy and Heat-Power Production Systems; Solar Energy and Heat-Power Production Systems; Wind Energy and Wind Turbines; Wave Energy; Power Production from Wave Energy, Energy Storage Systems.

MKM527 Design for Manufacturing and Assembly 3+0 7.5

Introduction: Overview of engineering design, Engineering design flow, Concurrent engineering; Engineering Design Criteria: Functionality, Strength, Aesthetics, Cost, Time; Overview of Design for Manufacturing and Assembly; Design for Casting and Injection Processes; Design for Forming Processes; Design for Machining Processes; Design for Joining Processes; Design for Additive Manufacturing; Design for Assembly; Example Applications.

MKM528 Advanced Level Nondestructive Inspection Methologies 3+0 7.5

Introduction; Material Imperfections and Defects; Control and Test Requirements; Visual Inspection Method; Magnifying/Microscope/Binocular Inspection Method: Introduction and definitions, Application and steps, Assessment on control results; Liquid Penetrant Inspection Method; Magnetic Particle Inspection Method; Eddy Current Inspection Method; Ultrasonic Inspection Method; Radiographic (X-Rays) Inspection Method, Phased Array Control Method.

MKM529 Selected Topics In Mechanics 3+0 7.5

Stress; Plane stress, General state of stress, Transformation of general state of stress, State of nonhomogenous stress; Strain: Transformation of plane strain, Three dimensional analysis of strain, Compatibility equations, Transformation of three dimensional strain; Linear Elastic Materials-Hooke's Law; Generalized Hooke's law for linear isotropic elastic solids and anisotropic solids, Thermoelastic constitutive relations, Compatibility condition in a state of plane stress; Energy methods: External works, Elastic strain energy, Conservation of energy, Impact loading, Work and energy under several loads, Virtual work, Castigloano's theorems; Theories of Failure.

MKM530 Vehicle Control Systems 3+0 7.5

Introduction to Vehicle modeling and testing; Tire modeling; TCS, ABS and ESP control systems; Suspension modeling; Lateral, longitudinal and vertical vehicle modeling; Active and Semi-Active Suspensions; Powertrain Control; Active Rear-Wheel Steering; Cruise Control; Adaptive Cruise Control. Modeling and Simulation via Matlab/Simulink.

MKM532 Biomass and Bioenergy Systems 3+0 7.5

Bioenergy will be defined and nutrients giving energy will be mentioned. Also, to learn about energy substance definitions and calculation methods. Nutrient requirements of fish: Energy calculations will be given importance by explaining the nutrient requirements of fish taken into breeding. Effects of protein / fat and protein / energy ratios, factors affecting energy metabolism. Preparation of Protein / Energy Balanced Feed Formulations.

MKM533 Exergy Analysis in Mechanical Engineering 3+0 7.5

First and second law of thermodynamics / Concept of Exergy Analysis, Physical and Chemical Exergy / Exergy Analysis Applications on Different Systems, Cooling Systems, Exergy Analysis, Exergy Analysis of Absorption Refrigeration Systems, Vehicle Emissions Exergy Analysis, II. Law of performance indicators, Exergy Analysis of Cooling Towers and Evaporative Coolers, Heating Systems, ExergyAnalysis, Exergy Analysis of Thermal Power Plants, Cogeneration Systems, trigeneration systems, Exergy Analysis of Geothermal Systems, Ecological Exergy Model / Exergy-Economic Relations and Analysis.

MKM534 Thermal System Design 3+0 7.5

Fundamentals of Thermal System Design: Concept and evaluation, Computer aided thermal design; Fundamentals of Thermodynamics: Control volume, Properties, Cogeneration model; Modeling and Design Analysis: Design Approach; Exergy Analysis: Physical exergy, Exergy balance, Chemical exergy; Fundamentals of Heat Transfer: Conduction, Convection, Radiation; Heat and Fluid Flow Applications: Fins, Electonic device cooling; Thermodynamics, Heat and Fluid Flow Applications: Heat transfer irreversibility, Air pre heaters; Thermoeconomic Analysis: Fundamentals of Thermoeconomic Analysis, Variables, Evaluation.

MKM535 Advanced Fluid Mechanics in Mechanical Engineering 3+0 7.5

Introduction to fluid mechanics; Fundamentals of fluid statics; Introduction to Fluid Dynamics, Streamlines, Streaklines, Pathlines, Flow rate, Mean velocity; Integral Form of Flow Equations: Conservation of mass, Conservation of momentum, 1st and 2nd law of thermodynamics; Bernoulli equation; Differential Formulation of Fluid Flow: Continuity equation, Euler's equation, Navier-Stokes equation, Energy equation, Boundary layer theory and dimensional analysis; Micro-nanoscale fluid mechanics applications.

MKM592 Seminar 3+0 7.5

MKM599 Term Project 3+0 0.0

MKM611 Artificial Intelligence in Mechanical Engineering Applications 3+0 7.5

Artificial intelligence definition, basic concepts and techniques; Expert systems and engineering applications; Fuzzy logic and engineering applications; Decision support systems and applications; Genetic algorithms and application examples; Artificial neural networks: structure and basic elements of artificial neural networks; The first artificial neural networks, artificial neural network models, back propagation networks; Mechanical Engineering applications of artificial neural networks.

MKM612 Micro-Nanoscale Heat Transfer 3+0 7.5

Introduction to nanotechnology; Micro-nanoscale heat transfer concepts, Deviation from the macroscopic theory; Phonons, photons and electrons as energy carriers; Energy quantization; Energy states in solids; Statistical thermodynamics; Energy transfer by waves; Size effects on heat transfer mechanisms (conduction, convection and radiation); Near-field radiative transfer; Special topics.

MKM613 Advanced Exergy Analysis of Energy Systems 3+0 7.5

First And Second Law of Thermodynamics / Concept of Exergy Analysis, Physical and Chemical Exergy / Exergy Analysis Applications on Different Systems, Endogenous Exergy Destruction; Exogenous Exergy Destruction; Avoidable Exergy Destruction; Inevitable Exergy Destruction; Advanced Exergy Analysis in Cooling Systems, Advanced Exergy Analysis in Heating Systems, Advanced Exergy Analysis in Thermal Power Plants, Cogeneration Systems, Trigeneration Systems, Advanced Exergy Analysis in Geothermal Systems.

MKM614 Automotive Control Systems 3+0 7.5

Introduction to Automobile modeling and testing; Automobile Tire modeling; TCS, ABS and ESP control systems; Automotive suspension modeling; Automatic control systems of vehicle longitudinal dynamics; Automatic control systems of vehicle lateral dynamics; Road and driver models; Active and Semi-Active Suspensions of automobiles; Control algorithms of automobiles; Powertrain control of automobiles; Active rear-wheel steering of automobiles; Cruise control; Adaptive cruise control. Modeling and Simulation of Automobiles via Matlab/Simulink and IPG-CarMaker.

MKM616 Advanced Thermodynamics in Mechanical Engineering 3+0 7.5

Thermodynamics I. and II. Basic Concepts of Laws and Their Applications / Entropy Production /Exergy Analysis Concept, Systems with Chemical Reactions / Irreversible Thermodynamics / Exergy Analysis Applications on Different Systems; Cooling Systems, Heating Systems, Thermal Power Plants, Cogeneration Systems, Trigeneration Systems, Geothermal Systems.

MKM790 Thesis 0+1 30.0

MLZ501 The Structure-Property Relationships in Materials 3+0 7.5

The Structure of Materials; Levels of Materials Structure; Introduction to Structure-Property Relationships in Materials; Pauling Principles in Ionically Bonded Systems; Crystal Chemistry; Symmetry Operations; Symmetry Components; Point Groups and Their Stereograms; Space Groups; Transformation of Space Groups to Point Groups; Transformation Components for Symmetry Components; Neumann Principle; Analytical Form of Neumann Principle; Heckmann Diagram; Thermodynamic Relations; Specific Heat and Entropy; Pyro-electricity; Stress and Strain; Thermal Expansion; Piezoelectricity and Piezoresistance; Application Examples.

MLZ502 Thermodynamic Applications in Material Science 3+0 7.5

The Zerowth, First, second, and Third Laws of Thermodynamics; Ellingham Diagrams; One-component Phase Diagrams; The Behaviour of Raoultian, Henrian and Regular Solutions; Gibbs Free Energy-Composition and Phase Diagrams of Binary Systems; Statistical Interpretation of Entropy; Reactions Involving Gases: the effect of temperature and pressure on the equilibrium constant, reaction equilibrium as a compromise between enthalpy and entropy; Reaction Equilibria in Systems Containing Components in Condensed Solution: criteria for reaction equilibrium, alternative standard states, binary systems containing compounds, graphical representation of phase equilibria, the solubility of gases in metals, solutions containing several dilute solutes; Electrochemistry: the relationship between chemical and electrical driving forces, the effect of concentration on EMF, formation cells, concentration cells, Pourbaix diagrams.

MLZ503 Electrical Properties of Materials 3+0 7.5

Electrons in Crystal; Electrical Conduction in Metals and Alloys; Superconductivity; Thermoelectric Phenomena; Semiconductors and Semiconductor Devices; Electrical Properties of Polymers, Ceramics, Dielectrics, and Amorphous Materials; Optical Properties of Materials; Applications (Electro-Optical Waveguides, Optical Storage, Complementary Metal?Oxide?Semiconductors (CMOSs), Charge-Coupled Devices (CCDs), LEDs, LCDs, LASERs); Magnetic Properties of Materials; Applications (Permanent Magnets; Magnetic Memory and Recording, Magnetic Detection and Sensors); Thermal Properties of Materials; Thermal Conduction and Expansion in Metals and Alloys; Applications (Thermocouples, Thermal Camera and Detectors).

MLZ504 Fracture Mechanics of Materials 3+0 7.5

Introduction; Fundamentals of Fracture Mechanics; Dislocations, Plastic Flow and Stresses; The Fracture Strength; The Factors Affecting Elastic Modulus in Ceramics; Impact Resistance and Toughness of Ceramics; Critical Crack Size; Fracture Surface Energy; Work of Fracture; The Effects of Coefficients of Thermal Expansion Difference on Mechanical Properties; Thermal Stresses and Fracture; The Determination of Thermal Shock Parameters for the Industrial Applications; Thermal Shock Behaviour; Engineering Design Data.

MLZ505 Thermal Analysis of Polymeric Materials 3+0 7.5

Properties of Thermoplastics, Thermosets and Elastomers, Introduction to Polymer Thermal Analysis, Polymer Physics, Definition of Glass Transition, Melting and Crystallization for Different Polymer Types. Differential Scanning Calorimetry (DSC) and Its Working Principles, Real Life Examples to DSC Applications with Hands on Experiments, Thermogravimetry (TG) Analysis and Its Working Principles, Real Life Examples to TGA Applications with Hands on Experiments, Thermo Mechanical Analysis (TMA) and Its Working Principles, Real Life Examples to TMA Applications with Hands on Experiments, Introduction to Dynamic Mechanical Analysis (DMA), DMA Applications with Hands on Experiments. Introduction Micro-Thermal Analysis.

MLZ506 Mathematical Methods in Polymer Science and Technology 3+0 7.5

Molecular Weights and Numerical Average of Polydispersity Indices and Calculations of Weight Averages; Stoichiometry of Polymerization Reactions, Their Kinetics and Transformations; Crystallization, Polymer Solutions, Polymer Mixtures and Calculations of Miscibility Parameters; Calculations Based on Viscoelasticity; The Use of WLF Equation; Heat Transfer Calculations; Stress-Strain Calculations in Fiber Containing Composites; Calculations in Molding Presses; Extrusion Calculations; Heat Treatment Calculations; Other Calculations in Polymer Production.

MLZ507 Fundamentals of Polymer Engineering 3+0 7.5

Introduction to Polymer Engineering, Engineering Plastics, Polymerization, Copolymers and Cross-Linked Polymers, Physical and Chemical Properties of Solid Polymers, Crystalline and Glassy Polymers, Creep and Stress Relaxation in Polymers, Time Dependent Analysis of Viscoelastic Polymers, Fracture Mechanics of Polymers, Extrusion, Injection Molding, Thermoforming, Blow Molding, Compression and Transfer Molding.

MLZ508 Mechanics of Polymer-Based Laminated Composites 3+0 7.5

Introduction to Polymer Composites, Overview of Constituents Material Forms, Processing and Applications, Macro-mechanical Behavior of A Lamina, Orthotropic Material Properties, Transformation of Coordinates, Lamina Strength Criteria, Micromechanical Behavior of Lamina, Classical Laminate Theory, Thermal Effects, Laminate strength, Delamination, Matrix Cracking, and Durability, Inter-laminar Stresses, Edge Effects, Fatigue and Fracture, Analysis of Laminated Beams, Composite I Beams, Shear in Composite Beams Design Examples.

MLZ509 Advanced Composite Materials 3+0 7.5

Introduction; Classification of Composites; Ceramic Matrix Composites; Nano-composites; Laminate Composites; Metal Matrix Composites; The Properties and Conditions Required for Matrix and Reinforcement Phases in Composite Materials; The Effects of Thermal Expansion Mismatch in Composite Materials; Fracture Strength of Composites; Mechanical Properties of Composites; Fracture Mechanisms of Composites; Toughening Mechanisms; Properties of Interfaces and Thermal Stresses; Thermal Shock Parameters; Stress-Strain Behaviour of Ceramics with the Addition of Reinforcement Phase.

MLZ510 Thin Film Production and Vacuum Technologies 3+0 7.5

Review of Materials Science; Vacuum Science and Technology; Principles of High Vacuum; Thin Film Evaporation Process; Discharge, Plasmas, and Ion-Surface Interactions; Plasma and Ion Beam Processing of Thin Films; Chemical Vapor Deposition; Film Deposition; Substrate Surfaces and Thin Film Nucleation; Physical Vapor Deposition; Plasma Etching; Sputtering; Electron Beam Evaporation; Epitaxy; Film Structure; Electrical Properties; Characterization Techniques.

MLZ511 Dielectric Materials and Devices 3+0 7.5

Transformations and Tensors; Crystals and Texture Symmetry; Curie Principle and Neumann?s Law; Polar Tensors; Pyroelectricity; Permittivity; Piezoelectricity; Elasticity; Thermodynamics; Equlilibrium Properties; Axial Tensors; Piezomagnetism; Magnetoelectricity; Pyromagnetism; Magnetic Symmetry-Time Reversal, Hysteretic Properties-Domains; Transport Properties; Thermal and Electrical Conductivity; Galvanomagnetic Phenomena; Thermoelectric Phenomena; Thermomagnetic Phenomena; Waves Acoustics and Optics; Optical Activity.

MLZ512 Applications of Crystallography 3+0 7.5

Summary of Crystallography; Stereographic Projections and Their Applications; Slip in Single Crystals and Diehl?s Rule, Diffraction, Reciprocal Space, Ewald Sphere, Polymorphism and Polytypes, Rutile and Anatase Crystal Structures and their Applications, Zinc Sulfide Crystal Structures and Piezo and Pyroelectricity, Relationship between Optical Anisotropy?Crystal Structure; Interaction Colours and Photoelasticity, Olivin-Spinel Phase Transitions, Perovskite Structure, Superconductivity, Phase Transformations, ccp?hcp Phase Transformations and Shape Memory Alloys, Silicon Dioxide, Zirconia, Silicon Nitride and Silicon Carbide Phase Transformations.

MLZ513 Raw Materials and Mineral Processing 3+0 7.5

Introduction; Ceramic Raw Materials; Clays, Quartz, Feldspars, Limestone, Marble and Other Raw Materials; Mineral Processing: Crushing, Grinding, Screening, Classification; Sizing Classification and Handpicking Enrichment; Gravity Separation; Magnetic Separation; Electrostatic Separation; Flotation; Chemical Enrichment

MLZ514 The use of Glass Materials in Industry 3+0 7.5

Introduction; Importance of Glass and Glassy Materials in Industry; Introduction to Glaze Science; Certain Raw Materials Used in Glaze Production; Frit Production; Glaze Preparation and Application; Glaze-Body Interactions; Characterisation of Glazed Products; Technologically Important Glazes; Enamel Production; Technologically Important Enamels; Enamel Defects and Their Corrections.

MLZ515 Refractory Technology 3+0 7.5

Classification and Properties of Refractories; Production Process and Test Methods; Industrial Applications; Properties and Application of Basic Refractories; Properties and Application of Acidic Refractories, and Corrosion Resistance; Fundamentals of Fracture Mechanics; Determination of Mechanical Properties; The Effects of Coefficients of Thermal Expansion Difference on Mechanical Properties of Refractories; The Determination of Thermal Stress and Shock Parameters for the Industrial Applications; Thermal Shock Behaviour of Refractories; Preparation of Refractory Samples; Mechanical Testing; Microstructural Examinations in Scanning Electron Microscopy.

MLZ516 Coating Techniques 3+0 7.5

An Introduction to Thin Coating; Coating Types and Process Steps; Evaluation of the Parameters for the Best Coating for a Given Application; Thermal Spraying Methods (Plasma Spraying, Low Pressure Plasma Spraying; Flame Spraying, HVOF Spraying; Their Applications and Coating Properties; TBC Coatings; Chemical Vapour Deposition (CVD); Metal Organic Chemical Vapour Deposition (MOCVD); Plasma CVD; Process Parameters, Application Areas; Physical Vapour Deposition, Process Parameters and Application Areas; Coating Properties; Ion Implantation ; Hardness, Friction and Wear Principles and Mechanisms

MLZ517 X-Ray Diffraction Techniques in Materials Characterisation 3+0 7.5

Importance of materials Characterization; Importance of XRD Techniques in Materials Characterization; Techniques Used in Materials Characterisation and their Difference; Electromagnetic Radiation; The Continuous Spectrum; The Characteristic Spectrum; Absorption; Filters; Production of X-rays; Detection of X-rays; Introduction of the XRD Device; Specimen Preparation Methods; Interpretation of XRD Spectra; Lattices; Crystal Systems; Symmetry; Primitive and Non-primitive Cells; The Stereographic Projection; The Stereographic Projection; Diffraction Theory I: Directions of Diffracted Beams; Diffraction; Bragg Law; X-ray Spectroscopy; Diffraction Directions; Diffraction Methods; Diffraction Under Non-ideal Conditions Diffraction Theory-II: Intensities of Diffracted Beams: Scattering by an Electron; Scattering by an Atom; Scattering by a Unit Cell; Structure Factor Calculations: Multiplicity Factor, Lorentz Factor; Absorption Factor; Temperature Factor; Intensities of Powder Pattern Lines; Application; Determination of Particle Size; Determination of X-ray Density; Depth of X-Ray Penetration; Determination of Crystal Structure; Indexing Patterns of Cubic Crystals; Indexing Patterns of Noncubic Crystals; Determination of the Number of Atoms in a Unit Cell; Determination of Atom Positions¸ Quantitative XRD; X-Ray Fluoerescence (XRF); XRF Applications.

MLZ518 Strengthening Mechanisms in Materials 3+0 7.5

Classification of Materials; In Materials: Mechanical Properties; Mechanical Behaviours; Thermal Properties and Behaviours; Imperfections in Solids; Dislocations and Plastic Deformation; Mechanisms of Strengthening in Metals; Recovery, Recrystallization and grain growth; Imperfections in Ceramics and Mechanisms of Plastic Deformation; Defects in Polymers; Mechanisms of Deformation and for Strengthening of Polymers; Strengthening Mechanisms in Composites.

MLZ519 Atomic Force Microscopy and Applications 3+0 7.5
Basics of Atomic Force Microscopy; Historical Background; Components of Microscope, scanning Modes, Calibration; Tip-Sample Interaction; Imaging and Compositional Analysis; Mechanical Property Analysis; Nano-Indentation and Scratch Resistance Measurements; Elec-trical Property Analysis; Magnetic Property Analysis; Nano-Production Techniques with AFM.

MLZ521 Fracture Mechanics of Materials 3+0 7.5
Definition, Importance and History of Fracture Mechanics: Historical perspective, Fracture mechanics for design, Effect of materials' properties on fracture; Linear Elastic Fracture Me-chanics: An atomic view of fracture, Effect of stress concentration on flaws: Griffith energy balance, Energy release rate, Instability and the R curve; Crack Tip Plasticity Zone; Plastic zone shape; Elastic Plastic Fracture Mechanics: Crack-tip opening displacement, The J integral, Relationships between J and CTOD; Fatigue Fracture Formation: Fatigue diagram, Fatigue plastic zone; Materials Behavior: Fracture mechanism in metals, Facture mechanism in non-metals, Theoretical and practical research and discussion.

MLZ522 Application of Electrochromic and Photochromic Polymers 3+0 7.5
Fundamental principles of photochemistry and electrochemistry; Modern techniques of electrochemical characterisation; Chromism, Electrochromism, Polyelectrochromism; Electrochromic systems; kinetics and mechanism; Construction of electrochromic device; Organic monomeric chromes, Inorganic chromic systems; Electroactive conductive polymers; Photochromic viologen-based systems; Photochromic liquid crystal polymers; Photoelectrochromism; Matrix polymers; Photostimulated conformation changes of polymers in solution and gel phase; Last developments.

MLZ523 Polymer Chemistry and Physics 3+0 7.5
Basic Concepts of Polymer Science; Microstructure and Molecular Weight; Chemical Bonding and Polymer Structure; Step-growth and Addition Polymerization; Polymerization Kinetics; Probability and Statistics of Polymerizations; Stereochemistry of Polymerization; Reactions of Polymers; Ideal and Real Chains; Thermodynamics of Polymer Solutions and Blends; Flory-Huggins Equation and Cohesive energy Density; Random Branching and Gelation; Predicting Polymer Properties by Computational Methods.

MLZ524 Electrochemical Characterization of Conducting Polymer 3+0 7.5
Conductive mechanism of conducting polymers; Electrochemical properties of conducting polymers; Conducting polymer-based electrochemical sensors; Potentiometric, Conductometric, Amperometric sensors ; Electrochemical/voltammetric sensors; Cyclic voltammetry based sensors; Chronoamperometry based sensors; Differential pulse voltammetry, a branch of square wave voltammetry based sensors; Electrochemical or voltammetric enzyme based biosensors: Glucose sensors, Ethanol electrodes, Urea electrodes and their detection mechanism; Electrochemical / voltammetric enzyme based immunosensors and DNA sensors and their detection mechanism.

MLZ525 Cutting Tool Materials 3+0 7.5
Definition of machining and classification of traditional machining techniques; The effect of cutting forces and heat on properties of materials in machining; Cutting tool geometry and its relations to materials properties; cutting parameters and its relations to materials properties; Wear of cutting tools in machining operations; High speed tool steels and their utilizations; Carbide tools and their utilizations; cubical boron nitride (cBN) and polycrystalline diamond (PCD) ultra-hard tools and their utilizations; Oxide ceramic cutting tools and their utilizations, Non-oxide ceramic cutting tools and their utilizations.

MLZ551 Mechanical Behavior of Materials 3+0 7.5
Mechanical Fundamentals; Stress and Strain Relationships for Elastic Behavior; Theory of Plasticity; Metallurgical Fundamentals; Plastic Deformation of Single Crystals; Dislocation Theory; Strengthening Mechanisms; Fracture; Applications to Materials Testing; The Tension; Hardness and Torsion Tests; Fracture Mechanics; Fatigue; Creep; Brittle Fracture and Impact Testing; Plastic Forming of Metals; Forging, Rolling of Metals; Extrusion; Drawing of Wires; Sheet-Metal Forming.

MLZ552 Materials Selection For Aircraft Structure 3+0 7.5
Significant Factors for Materials Selection; Restriction Factors for Materials Selection; Basic Stages for Materials Selection; Significance of Materials Tests for Materials Selection and Analysis of Test Data; Determination of Significance Rance of Materials Characteristics and Comparison of Their Characteristics; Selection of Nominee Materials and their Comparison.

MLZ553 Mechanical Behavior of Composite Materials 3+0 7.5
Introduction to Composite Materials; Macro mechanical Behavior of o Lamina; Stress-Strain Relations for Anisotropic Materials; Elastic Constants for Orthotropic Materials; Strength Theories for an Orthotropic Lamina; Maximum Stress Theory; Maximum Strain Theory; Tsai-Hill Theory; Micromechanical Behavior of a Macro mechanical Behavior and Laminate; Bending and Buckling Equations of Laminated Plates.

MLZ554 Structure and Properties of Aircraft Materials 3+0 7.5

Atomic Structure and Packing of Atoms In 3D; Atomic Bonding; Dislocations; Dislocations and Plastic Deformation; Relationship Between Atomic Structure and Mechanical Properties; Mechanical Properties and Measuring Methods; Tensile; Compression; Bending, Shear; Impact; Fatigue and Creep; Materials Selection for Different Mechanical Applications; Case Studies for Aircraft Materials Selection.

MLZ592 Seminar 3+0 7.5

MLZ599 Term Project 3+0 0.0

MLZ601 Scanning Electron Microscopy and Chemical Analysis Techniques 3+0 7.5

Introduction; What is the Importance of Microstructural Investigations?; What are the Reasons for the Use of Electron Microscopes; Which Techniques are Used for the Characterisation of Microstructures; Specimen Preparation for Electron Microscopy; Interactions between Electrons and Specimen; Depth of Signals Produced as a Result of Interactions and their Use; Scanning Electron Microscopes (SEM) and its Parts; Chemical Analysis Techniques: Energy Dispersive X-ray Spectrometers (EDX) and Wavelength Dispersive X-ray Spectrometers (WDX); Parameters to be Known to Obtain Best Quality Images and Reliable Chemical Analysis; Comparison with Enviromental Scanning Electron Microscopes (ESEM) and Other Techniques; Investigation of Different Materials in SEM.

MLZ602 Transmission Electron Microscope and Chemical Analysis Techniques 3+0 7.5

Importance of Grain Boundaries; Classification of Grain Boundaries; Low-Angle Grain Boundaries and Their Properties; High-Angle Grain Boundaries and Their Properties; Grain Boundaries Made by Different Phase Grains; Ceramic-Metal Interface Surfaces; Techniques Used to Investigate Grain Boundaries; Transmission Electron Microscopes; Dark Field; Light Field; Fresnel Unfocused and High Resolution Power Image Techniques; Electron Diffraction; Analysis of Diffraction Patterns; Chemical Analysis Techniques; Energy Dispersive X-Ray Spectrometer; Parallel Electron Energy Losses Spectrometer.

MLZ603 Special X-Ray Techniques and Their Applications 3+0 7.5

Reflectivity of X-Rays from Soft Matter Surfaces and Multiple Interfaces; Roughness and Density Profiles; Reflectivity Experiments and Experimental Consideration; High Resolution Diffractometers and Reflectometers; Grazing Incidence and Exidence Diffraction and in-Plane Diffraction Techniques; Reciprocal-Space Map and Q-Scan Techniques; Limits on the Use of Powder Diffractometer; High Temperature Powder Diffractometer Techniques.

MLZ604 Inorganic Powder Synthesis Technologies 3+0 7.5

Introduction to Ceramic and Metal Powder Synthesis Methods; Powder Synthesis by Atomization; Powder Synthesis via Precipitation from Homogeneous Solutions; Powder Synthesis in Molten Salt; Powder Synthesis by Sol-Gel Technique; Interpretation of Solubility-pH Diagrams; Nucleation and Growth Kinetics; Size and Shape Control in Powder Synthesis; Composite and Multi-Functional Powder Preparation Techniques.

MLZ605 Sintering of Particulate Materials 3+0 7.5

Introduction to Sintering Terms; Processing of Ceramic and Metal Powders; Microstructure-Sintering Relations; Sintering Analysis Techniques; Solid State Sintering; Liquid Phase Sintering; Viscous Sintering; Herring's Scaling Law; Sintering Maps; Deformations Occurring during Sintering and Approaches to Prevent Them; Pressure Assisted Sintering Techniques (Sinter Forging; Hot Pressing etc.); Other Sintering Techniques (Transient Liquid Phase Sintering, Reactive Sintering; Microwave Sintering, etc.); Examples of Sintering Methods Applied to Ceramic and Metal Particulate Systems; Grain Growth (Normal Grain Growth; Exaggerated Grain Growth; Anisotropic Grain Growth, etc.)

MLZ606 Phase Transformation Reactions of Metals 3+0 7.5

Free energy, interface energy and activation energy terms; Structure of liquids; Liquid-solid interface; Solidification models; Solidification microstructures; Solidification kinetics and industrial control; Chemical partitioning and diffusion direction; Interaction of free energy and phase diagrams; Examples of chemical partitioning reactions of alloy systems; Classification of solid-solid transformation reactions and interface types; Diffusional transformation reaction mechanisms, kinetics, crystallography and morphologies; Industrial examples of diffusional transformation reactions through alloy systems; Mechanism of martensitic transformation, kinetics, crystallography and morphology; Industrial examples of martensitic transformation through alloy systems; Mechanism of spinodal decomposition, kinetics, crystallography and morphology; Industrial examples of spinodal transformation reactions through alloy systems.

MLZ607 Alloy Development-Principles, New Horizons and Extreme Applications 3+0 7.5
Alloy development principles; trends, causes and products at existing alloy systems for conventional applications; Alloy selection examinations at applications that need tough property combinations; Alloy development attempts and products for cutting-edge applications; Alloy theory and microstructures of alloys; Steel types: Complication and expansions at classification; New trends, causes and products at steels; High temperature alloys (superalloys): new trends, causes and products; Aluminium alloys: new trends, causes and products; Titanium alloys: new trends, causes and products; Magnesium alloys: new trends, causes and products; Magnetism and magnetic alloys: new trends, causes and products; Alloys selection examples for extreme applications; Trends and products at alloy development for extreme applications.

MLZ608 Polymer Rheology 3+0 7.5
Rheology in Engineering Applications, Rheology of Polymers, Review of Vector and Tensor Analysis Flow, Newtonian Fluid Mechanics, Isothermal Flow Problems for Generalized Newtonian Fluids, Non-isothermal Flow Problems for Generalized Newtonian Fluids, Shear and Shear-Free Flows, Steady Shear Flow Material Functions, Unsteady Shear Flow Material Functions, Shear Free Flow Material Functions, Linear Viscoelastic Measurements, Parallel-Disk Viscometer, Cone-And-Plate Parallel-Disk Capillary Rheometer Slit Rheometer Newtonian Fluid and Hookean Solid, Linear Viscoelastic Fluids, Linear Viscoelastic Rheological Properties, Experimental Rheological Characterization of Different Types of Polymers with Hands on Experiments.

MLZ609 Modeling of Polymer Composites Manufacturing Processes 3+0 7.5
Introduction to Polymer Composites, Polymer Composite Fabrication Processes, Mass, Heat And Momentum Transfer Equations for Polymer Composite Manufacturing, Introduction to Polymer Composites Process Modeling, Introduction to MATLAB Programming Assisted Numerical Calculations, General Aspects of Advanced Thermoplastic and Thermoset-Matrix Fiber-Reinforced Composites, Introduction to Liquid Composite Molding Processes (Resin Transfer Molding and Vacuum Assisted Resin Transfer Molding), LIMS (Liquid Injection Molding Simulation) Coupled with Hands-on Manufacturing of Composite Parts.

MLZ610 Kinetics 3+0 7.5
Kinetics of Diffusion: Ficks First Law and applications, Ficks Second Law and Semi-Infinite System Applications, Ficks Second Law and Finite System Applications, Ficks Second Law and Laplace Transformations, Multi ? Phase Diffusion; Chemical Diffusion: Boltzman-Matano Analysis, Atomistic Theory of Diffusion, Fast Diffusion Regions, Ionic Diffusion; Kinetics of Chemical Reactions: Introduction, Determination of Reaction Orders and Rate Constants, Reaction Mechanisms and Corresponding Rate Laws, Solid ? Gas Reactions in Materials Science: Kinetics of Metal Oxidation, Kinetics of PVD Process, Kinetics of CVD Process

MLZ611 Diffusion in Solids 3+0 7.5
Introduction; Diffusion Equations; Diffusion in Alloys; The Effect of Concentration Gradient on Diffusion; Diffusion in Non-Metallic Materials; Suitable Environments for Diffusion and Diffusion Methods; Heat Diffusion in Solids and Electrolyze.

MLZ612 Ferroelectric Materials and Devices 3+0 7.5
Crystal Structure and Ferroelectricity; Origin of Spontaneous Polarization; Origin of Field Induced Strain; Electrooptic Effect; Applications of Ferroelectrics; High Permittivity Dielectric; Pyroelectric Devices; Piezoelectric Materials; Piezoelectic Resonance; Piezoelectric Transformers; Ultrasonic Transducers; Surface Acoustic Wave Devices; Piezoelectric Actuators; Ultrasonic Motors; Electrooptic Devices; Wave Guide Modulators; PTC Materials; PTC Phenomenon; PTC Thermistors; Grain Boundary Layer Capacitors; Composite Materials.

MLZ613 Crystal Anisotropy 3+0 7.5
Introduction and Overview; Permittivity; Polarization Mechanism; Dispersion and equivalent circuits; High Voltage Insulators; Electric Breakdown Mechanisms; Substrates and Packaging; Thick and Thin Film Processing; Resistance; Electronic Conduction; Fixed Resistors, PTC and NTC Thermistors, Varistors and Barrier Layer Capacitors, Humidity and Chemical Sensors; Ceramic Electrodes and Superconductors; Ionic Conduction and Batteries; Capacitors; Disk, tubular, Multilayer; Low k Ceramics: Temperature coefficient, Microwave dielectric resonators.

MLZ614 Spintronic and Applications 3+0 7.5
Introduction to Magnetism; Spin Dependent Transport; Magnetoresistive (MR) Effects (X-MR Effects: Anisotropy-MR; Giant-MR; Tunnel-MR and Closal-MR Effects); Electrical Transport in Nonmagnetic and Magnetic Metals; Spin Dependent Tunneling; Ferromagnetic-Isolator and Superconductor-Isolator Tunnel Contacts; Spin-Valves; XMR-Effects and Their Applications.

MLZ615 Material and Energy Balance in Production 3+0 7.5
Fundementals of energy balances, material balances for processes without reaction; recyle, bypass and industrial application; gasous and liquid fuels, calculations of entalphy changes; application of Energy balances to open and closed systems; Applications of energy balances in processes that include chemical reactions; Energy balances in lime and cement industries;

Formulations of ceramic mixes; Phase diagrams in ceramics; The equilibrium relations between liquid and solid phases; Design of a kiln in ceramic industry.

MLZ616 Colloid Chemistry and Reological Behaviour 3+0 7.5

Introduction to Colloid Chemistry and Classification; Colloidal Systems and Importance of Interface; Kinetic Properties; Surface Tension and Surface Energy; Gibbs Adsorption Equation; Adhesion, Cohesion, and Diffusion; Physical Adsorption by Solids; Physical Adsorption by Solids; Langmuir Isotherms; Freundlich Adsorption Isotherm; BET Adsorption Theory; Electrical Phenomena at Interfaces; Electrical Double Layer and Zeta Potential, DLVO Theory; Colloid Stability; Flotation; Surfactants; Wetting; Reological Behaviour; Pseudoplasticity; Dilatant Flow Behaviour; Thixotropy, Effective Parameters on Viscosity; Reological Applications; Stability of Clay Based Mud; Slip Casting; Ceramic Glazes.

MLZ617 Inorganic Pigments and Pigments Interactions 3+0 7.5

Light and Colour; Colour Measurement Methods; Inorganic Pigments; Definitions; Classification and Crystal Structures; Pigment Production Process; Traditional Method; Sol-gel Method; Inorganic Pigments Used in Ceramics Industry; Pigments for Glazes; Pigments for Bodies; Inorganic Pigments Used in Plastics and Automotive Industry; Glaze-pigment and Body-pigment Interactions.

MLZ618 The Relationship between Structure and Properties in Industrial Glazes 3+0 7.5

Introduction; The Importance of Glassy Coating Materials in 21st Century?s Industry and Life; Certain Glaze Systems of Fast Firing Technologies; Utilization Possibility of Alternative Raw Materials in Glaze Production; Raw Material Based Cost Analysis and Adaptation to New Production Processes; Synthesis of Fast Firing Frits and Their Use in Glazes; Technological Improvements in Raw Glazes; New Detailed Characterization Techniques Applied to the Developed Products in order to Establish Structure-Property Relationships; The Interaction between Industry and Environment in Terms of the Technological Development; Adaptation of New Product Achieved as a Result of Micro-Structural Control to the Present Standards.

MLZ619 Phase Transformation Mechanisms of Metals 3+0 7.5

Concepts of Free Energy, Interface Energy and Activation Energy; Relationship between Free Energy and Phase Diagrams; Diffusion Mechanisms, Industrial Examples for Diffusion Mech-anisms; Diffusion Controlled Transformation Mechanisms: Kinetics, Crystallography and morphology, Industrial examples for diffusion controlled transformation mechanisms; Homo-geneous and Heterogeneous Nucleation Mechanisms: Kinetics and control parameters; Precipi-tation Mechanisms: Kinetics, Crystallography, Interphase Analysis; Mechanism of Precipitate Coarsening; Spinodal Transformations; Martensitic Transformations, Industrial Examples for Martensitic Transformations.

MLZ621 Electrical and Magnetic Characterization 3+0 7.5

Electrical: Two point probe technique (TPP), Four point probe technique (FPP), Impedance spectroscopy (IS); Magnetic: Vibrating sample magnetometer (VSM): Magnetic hysteresis, Magnetic Susceptibility, Magnetic Anisotropy, Temperature and Angular Dependence of Magnetization, Zero-Field- and magnetic-field cooling; Spin Paramagnetic Resonance (SPR); Ferromagnetic Resonance (FMR); THz-Time Domain Spectroscopy (THz-TDS); Material and Device Examples: Phase transition materials; Smart Materials; Magnetics Ceramic Materials; Nanomagnetic Materials; Magneto-Resistive Sensors; Micro-Electro-Mechanical Systems (MEMS).

MLZ622 Porous Materials 3+0 7.5

Introduction: The importance of adsorption, Physisorption and chemisorption, Types of adsorption isotherms; Thermodynamics of Adsorption at the Gas-Solid Interface; Methodology of Gas Adsorption; Adsorption at the Liquid-Solid Interface; Classical Interpretation of Physisorption Isotherms at the Gas-Solid Interface; Modelling of Physisorption in Porous Solids; Assessment of Surface Area by Gas Adsorption; Assessment of Mesoporosity; Assessment of Microporosity; Adsorption by Active Carbons; Adsorption by Metal Oxides; Adsorption by Metal-Organic Frameworks.

MLZ623 Structural and Optical Characterization 3+0 7.5

Optical spectrum: Radiation sources, Material-radiation interactions; X-ray diffraction (XRD): Grazing Incidence X-Ray Diffraction (GI-XRD), In-Plane X-Ray Diffraction (IP-XRD); X-Ray Reflectivity (XRR); X-Ray Photoelectron Spectroscopy (XPS); Raman Spectroscopy; Fourier-Transform Infrared Spectroscopy (FTIR); Ultraviolet-Visible Spectroscopy (UV-Vis-NIR); Surface Plasmon Resonance (SPR) Spectroscopy; THz-Time Domain Spectroscopy (THz-TDS); Material Examples: Phase transition materials; Smart Materials; Surface-Plasmon-Supporting Materials; Optical Absorbance Materials.

MLZ 624 Advanced Manufacturing Techniques 3+0 7,5

Definition of Manufacturing and Classification of Advanced Manufacturing Techniques: Advances in casting, Advances in powder metallurgy, Chemical machining techniques, Electrochemical machining and electrochemical grinding, Electro-discharge machining, Laser and Electron beam machining, Water-jet and abrassive-jet machining, Microand nano manufacturing and micromachining, Ultrasonic and friction welding, Resistance and Explosion welding, Diffusion welding,

Laser-assisted repairing and welding, Liquid-based additive manufacturing, Powder-based additive manufacturing, Deposition-based additive manufacturing.

MLZ 626 Material Characterization and Inspection Techniques 3+0 7,5

Microstructural Characteristics Affecting Material Properties: Composition, Grain shape and distribution, Grain size and distribution, Phase amount and distribution, Structure defects, Etc.; Characteristic Change and Transformations: Phase transformation temperature, Crystallization temperature, Decomposition temperature etc.; Classification of Characterization Techniques; Sampling and Preparation; Imaging Techniques: Light microscope, Electron microscopes; Non-Imaging Techniques: X-ray diffractometry, X-ray fluorescence spectrometry, Thermal Analysis; Other Techniques; Damage Detection and Quality Control Test Techniques; Fractography, Non-Destructive Testing Methods.

MLZ 628 Powder Metallurgy 3+0 7,5

Powder Metallurgy: Powder usage and industry; Characterization: Sampling methods; Particle Analysis: Size, Shape, Morphology, Density analysis; Internal Structure Characterization; Production: Mechanical, Electrolysis, Chemical and atomization methods; Powder Microstructure: Alloying, Solidification kinetics, Nano dimensional structures; Forming: Pressing, Binders, Injection molding, Extrusion, Other techniques; Principles of Sintering: Pore development, Condensation, Particle deformation in compression, Compression in mold, Cold isostatic pressing, Sintering of mixed powders; Powder Metal Technology in Additive Manufacturing: Powder bed additive manufacturing and powder feed additive manufacturing.

MLZ 630 Advanced Surface Engineering 3+0 7,5

Metallic Materials; A Major Problem Associated with the Use of Some of Them; İs The Potential Risk of Corrosion, Erosion and Wear Attacks in Their Working Environments; To Overcome Such Problems: Simulatons or in-vivo and in-vitro experimental studies ; Surface Engineering Approaches: Classified into two groups including surface treatment and surface coating; Advanced Surface Technologies that Provides Substantial Wear Reduction, Unmatched Surface Hardness, Mechanical Integrity and Improved Elastic Modulus, Reduced Potential for Metal Ion Release and Enhaced Performance In Particular for Aerospace Industry.

MLZ 632 Fracture Mechanics and Fatigue 3+0 7,5

Materials: Introduction, Introduction of materials, Production and processing of materials, Classification of materials, Mechanical properties of materials, Stress, Elastic theory, Strain theory of materials, Time deformation, Plastic strain theory; Fracture: Crack size and crack type, Linear elastic fracture mechanics, Griffith theory, Opening, Slip and tear mode, Instability and R curves.

MLZ651 Materials Science and Advanced Materials Technology 3+0 7.5

Materials Science; Atomic structure; Bonding Between Atoms; Chemical Reactions and Reactivity; The Crystalline State; Elastic and Plastic Behavior; Constitution; Electrical and Magnetic Properties; Materials Technology; The Shaping of Materials; Metals; Ceramics; Thermoplastics; Thermosetting Materials; Composite Materials; The Behavior of Materials in Service; Testing of Materials; Metal-Joining Processes; Macroscopic and Microscopic Examination of Materials.

MLZ652 Fatigue and Creep Behaviour of Aircraft Materials 3+0 7.5

Fracture and Toughness in Aircraft Materials; Fatigue Failure; Mechanism of Fatigue; Fatigue Crack Growth Analysis; Load Interaction; Case Studies for Aircraft Fatigue Failure; Creep and Creep Related Failure in Aircraft Engine; Kinetic Theory of Diffusion; Mechanism of Creep and Creep-Resistant Materials; The Turbine Blade-a Case Study in Creep Failure.

MLZ692 Seminar 3+0 7.5

MLZ790 Thesis 0+1 30.0

MLZ890 Thesis 0+1 30.0

MLZ890-0 Thesis (Thesis Proposal) 0+1 30.0

MOD501 Pattern Design in Textile 3+0 7.5
Importance of Pattern in Fashion Textile; Designing Patterns in View of Current Fashion Trends; Development of Textile Patterns (Imprinted and Woven); Relationship Between Patterns and Motifs; Basic Principles in Pattern Design; Methods of Pattern Design and Multiplication; Industrial Applications.

MOD503 Fashion Theories and Trends 3+0 7.5
Description of fashion concept, Theories of fashion: Bottom-down or class difference theory, Collective selection theory, Changing erogenous areas theory, Mass bazaar theory, Subculture influence theory; Definition of fashion trend and types of fashion trend: Long term fashion trends, Short term fashion trends; Factors influencing fashion trends: Political factors, Social factors, Economic factors, Technological factors; Current studies on fashion trend analysis, Cycle of fashion, Dissemination process of fashion.

MOD510 Fashion Concept in Design 3+0 7.5
Definition and Development Process of Fashion Concept; Art and Fashion Relation; Development Process of Fashion Concept in Design; Accepting a New Design in Different Levels of Society; Interaction Between Society and Fashion; Applications of Creating a Style According to the Conceptual Recommendations.

MOD511 Intelligent Textiles and Clothing 3+0 7.5
Basic Research and Design Procedure of Intelligent Textiles; Phase Change Materials: Phase change Technology, Thermo physiological comfort, Pcms in textile and clothing; Shape Memory Materials: Principles of shape memory materials, Smms for Textile Applications; Chromic and Conductive Materials: Photo chromic, Thermo chromic and Elctrochromic materials, Conductive Fibers and Yarns, Polypro Applications; Solar Textiles: Solar Cells, Photovoltaic, Textile Applications; Electronic Textiles: Principles of Wearable Electronics and Computers, Medical and Monitoring Applications of Electronic Textiles; Nanotechnology for Intelligent Textile Clothing; Future Trends in Intelligent Textile and Garment Applications.

MOD512 Art and Design 2+2 7.5
Creating and Improving Two and Three Dimensional Surface-Form Relations; Approaching Processes Like Subject, Object: Converting Concepts to Visual Language; Interpreted and Re-Commented; Improving Techniques and Abilities to Use Concepts Like Ratio-Proportion, Placement, Form and Volume by Using Study Methods Based onObservation; Forming Conceptual, Cultural and Functional Relations by the use of Separate Subjects Chosen by Individual Students.

MOD513 Advanced Projects in Fashion Design I 2+2 7.5
Scale; Function; Aesthetic; General Design Methods; Project Planning; General Design Strategy of an Organization; Methods and Principles About Creation of a Collection; Project Applications; Analyze of the Design Language; Design Challenging Conditions; Interaction Analysis; Cultural Analysis.

MOD514 Advanced Projects in Fashion Design II 2+2 7.5
Rapid Prototyping Methods and Applications; Formal and Functional Analysis of Potential Trends; Development of Alternative Solutions and Evaluation of Methods Used in Testing Steps; Using High Technology for Product Development andd513 Sample Analysis; Examining Design and Cost Relation.

MOD515 Fashion Design Presentation and Graphic Design Relation 3+0 7.5
Importance of Fashion Design Presentation: Scrutinizing the Tools and Techniques Used in Graphic Design Presentation; Crucial Factors Influencing Fashion Design Marketing: Graphic presentation techniques and graphic design within the changing fashion periods, Marketing and promotion of fashion design; A Semiotic Approach to the Relationship Between Fashion Design and Graphic Design.

MOD516 The Quest for a Form in Fashion Design 2+1 7.5
The Quest for a Form in Fashion Design: Shape, Form, Dimension, Two Dimension, Three Dimension, Modelling, Application, Technical Research; Extraordinary Researches and Applications on Design; Design and Form; Body Art Studies; Formless Applications; Design Solutions; Functional Design; Form Research: Theories of Form Applications on Different Fabrics, Constructivism, Kubism, Analyzing the School of Bauhaus.

MOD517 Design, Art and Fashion Relationship 3+0 7.5
Introduction to Design, Art and Fashion relations: Non-verbal communication between art and fashion, Relationship between artistic creation and design; Assessment of selected subjects by students in terms of design; Intellectual and Functional Relations on Fashion Design and Fashion Fact: Assessment of selected subjects; Student designs and assessment of selected student designs.

MOD518 Computer Based Technologies for Textile and Print Design Simulation 3+0 7.5

Introduction to Textile and Print Design: Background on fabric and print design; Fabric Types and Production Methods; Print Design and Printing Machines: Traditional methods and digital printing; Role of Computer Technology in Textile and Print Design; Main Computer Technologies and Software in Textile and Print Design; Benefits and Limitations of Computer Based Technologies for Textile and Print Design; Challenges and Future Trends.

MOD519 New Approaches to Design of Fashion Accessories 3+0 7.5

Definition of Accessories Design: Place and importance of accessories in fashion design, Sources; Creating a Collection of Accessories; Preparing a Collection; Market analysis, Distribution research, Synthesis of trends, Main idea, Compliance with formal design in accessories, Knowledge of materials, Choosing the correct material for design, Design applications, Project implementation; Determination of Design Criteria; Criticism in a Studio Atmosphere; Seminars and Evaluation by Juries.

MOD520 Experimental Draping 1+2 7.5

Research of Unusual Materials Used in Clothing Design; Evaluation of Production and Technical Properties of Materials; Surface Creation Studies from Selected Material or Materials; Evaluation of the Compatibility of the Properties of Different Surfaces in Originality and Draping Techniques; Properties and Importance of Draping Method in Obtaining Special Design Patterns; Points to be Considered in the Application of Draping Technique; Clothing Design Studies from Surfaces Created Using Draping Technique; Complementary Design Studies.

MOD521 Fiber Art I 3+0 7.5

Introduction to the History of Contemporary Textile Arts; Mini Textile Applications with Plant Fiber: Producing three-dimensional fiber art works in free and modular forms; Examination of Contemporary Fiber Arts Works; Contemporary Interpretation of Traditional Techniques in Textile Arts; Relationship Between Space and Fiber Art; New Creative Quests in Fiber Arts.

MOD522 Fiber Art II 3+0 7.5

Yarn and Fabric Applications in Textile Arts: Examination of contemporary art works by yarn and fabric specimens; Modern Textile Art Applications in Line with Design Principles; Investigation and Discussion of Modern Textile Art Samples; Three-dimensional Surface and Space Practices with the Use of Yarn and Fabric.

MOD523 Philosophy of Design 3+0 7.5

Concepts of Philosophy and Aesthetics; Use of Design Theories and Principles in Fashion and Textile Design; Relationship between Philosophy, and Industrial Textile Design and Fashion Design; Philosophical Analysis of the Reflection of Urban Culture in Public Sphere through Textile and Fashion Products; Critical Evaluation and Interpretation of Contemporary Design Products via Philosophical Methodology.

MOD524 Applied Studies on Natural Dyeing 2+1 7.5

Sustainability Practices in Textile Dyeing; Principles and Current Status of Natural Dyeing; Sources, Types and Extraction of Natural Dyes; Definition, Classification and Use of Mordans in Natural Dyeing, Determination of Suitable Dyes for Cellulose, Protein and Synthetic Fibers and Relevant Pre-treatments, Extraction of Dyes; Preparation and Dyeing of Different Textile Materials, Optimization of Pre-treatment, Extraction, Mordaning and Dyeing Processes; Measurement of Fastness Properties; Making Proposals to Improve Fastness Properties.

MOD525 Experimental Printing Design 3+0 7.5

Information about Printing Techniques: Analysis of textile literature, Block printing applications on fabric, Screen printing applications, Alternative new screen printing, Applications of transferred printing, Digital printing design, Mixed printing applications, Cross techniques applications, Different techniques applied by combined and diagonal methods, New experimental ideas, Preparing a presentation of prints produced, Alternative new prints on fabrics.

MOD526 Cultural Approaches in Fashion and Textile Desig 3+0 7.5

Textile as a Craft: The history of textile; The Industrial Revolution: Industrial revolution and the new world order, The industrial revolution, Science, art, Culture and social impacts, New requirement for textile- Training of Fashion Design, Debates on the original- local-conventional, Innovation in Art and Design,The technological developments and the concept of alienation in the 20th Century, Basis of the Development through of Women's Clothing Fashion, Quest for Authenticity and causes of Women's Clothing design in 20th Century of Design, Cultural Propositions in Women's Clothing, The variability of culture, The locality and modernity- Traditional - the original quest of the examination of Fashion's definition,

MOD527 Wearable Art 1+2 7.5

Basic Concepts: Conceptual art, Art and design, Wearable art; Themes: Classical art, New constructivism, Modern art, Textile design, Place and importance of textile design in fashion, Performance arts, Avant-garde fashion, Traditional Japanese art, Sustainable fashion, Concepts of green textile and slow fashion; Research on Wearable Art Materials: Identification of a theme, Methodology, Discussion of literature survey, Determination of techniques and materials, Application process, Report writing and presentation.

MOD528 Youth Subcultures and Fashion 3+0 7.5

The concept of culture and definitions: Judge (ruling) culture, Popular culture, Mass culture, Folk culture, High (elite) culture; Definitions of subculture, Sociology of subculture, Formation of subculture, Fashion from 1950 to 1980, Youth subcultures from 1950 to 1980: Reggae, Ted, Mod, Hipster, Beat, Skinheads, Hippi, Punk, Glam - Rock; Techniques of creating style of youth subcultures, The industrialization of fashion belonging to the youth subcultures , The influence of the clothing of youth subcultures on fashion designers and bran.

MOD529 Culturel Approaches in Fashion Design 3+0 7.5

Clothing History, semiotics, Iconic Community, clothing and aesthetic, Fashion and psychology, The industrial revolution, new world order, textile and fashion design education, the original- local-conventional, Innovation in Art and Design, Development of Textile Industry, Arts&Crafts movement, the aesthetic movement, wearable design suggestion,technological developments, Women's Clothing and Fashion, Cultural Propositions in Women's Clothing, The variability of culture, The definition of fashion as the phenomenon are discussed.

MOD530 Creativity in Clothing Design 3+0 7.5

Concepts of Design and Creativity; Creativity in Design Process: Preparation, Incubation, Illumunation, Evaluation; Creative Thought Theories: Gestalt theory, Psychoanalytic theory, Perceptual theory, Factorialist theory, Humanistic theory, Cognitive development theory; Features of the Creative Designer; Criteria of Creative Design: Originality, Functionality, Aesthetics, Production quality, Suitability to target group, Flexibility, Fluency; Factors Affecting Creativity: Motivation, Medium, Environment and Society, Family, Attitudes, Doctirines.

MOD531 Textile Surface Aplications in Wearable Art 1+2 7.5

Textile Surface Research: Application technique, Printing- Dyeing technique, Sewing- Embroidery technique, Weaving-Knitting technique, Folding- Crushing technique; Modern Art: New constructivism, 2000s, Performance arts, Body art; New Approches on Design: Contemporaray art and wearable art, An importance of textile design; Place of Wearable Art and Importance on Fashion Phenomenia: Technical solutions of wearable art, Contemporary textile surfaces, Wearable art and sustainability, Wearable art avantgarde textile surfaces application; Ecological Textile Surface Applications: Green textile slow fashion, Eco- Design application.

MOD532 Sustainability in Textile and Fashion Design 3+0 7.5

The Concepts and Applications of Recycling, Upcycling, Product Life Cycle, Sustainability, Sustainable Design; Sustainability Practices and Environmental-Friendly Production Methods in Textile and Fashion Industry; New Trends in Sustainable Textile and Fashion Design; Evaluation of Recycling and Upcycling Opportunities for Textile Wastes Through Case Studies; Recycling and Upcycling of Textile Wastes; Reporting and Evaluation of Experimental Studies.

MOD533 Garment Comfort 3+0 7.5

Human-Garment-Environment Interactions; The Concepts of Textile and Garment Comfort; The Importance and Components of Garment Comfort; The Attitude and Expectations of Users Towards Garment Comfort; Classification of Comfort; Factors Affecting Garment Comfort; The Effect of Material, Manufacturing technology and material construction on comfort properties; Comfort Properties of Textile Materials in the Form of Fibre, Yarn and Fabric; Garment Comfort Test Methods.

MOD534 Natural Printing Applications in Wearable Art 1+2 7.5

Definition and History of Wearable Art; Methods and Techniques Used in Wearable Art; Examination of Textile Artists and Their Works in the Field of Natural Printing; Definition and History of Natural Printing Technique; Types of Natural Printing; Types of Plants, Mordants and Application Methods Used in Natural Printing; Natural Printing Applications on Cotton, Silk, Linen, Wool, Leather; Experimental Studies with Rust Printing; Spirit Cloth Design Applications; Evaluation of Applications.

MOD535 Digital Technologies for Textile and Garment Design 3+0 7.5

Introduction to Textile Design: Basics of woven and knitted fabric design; Fabric Types and Production Methods: woven fabrics, preparation processes, weaving process, knitted fabrics, knitting process; The Role of Computer Technologies in Textile and Garment Design; Computer Technologies and Software used in Textile Design: software used in woven fabric design, software used in knitted fabric design, software used in printing design; Software and Technologies Used in Garment

Design: three dimensional dimensioning systems, pattern software, 2D garment simulation, 3D garment simulation, fit control; Benefits and Limitations of Digital Technologies Used in Textile and Garment Design; Challenges and Future Trends.719

MOD536 Research Methods and Applications in Textile and Fashion Design 3+0 7.5
Basic Concepts of Science; Scientific Paradigms; Quantitative Research Design: Descriptive and .... Models, Experimental Methods; Data Analysis in Quantitative Research: Descriptive Data Analysis, Parametric Data Analysis, Non-parametric data analysis; Qualitative Research Design: Ethnographic research, Phenomelogical research, Case Study, Historical study, Action research, Narrative research, Grounded theory; Writing Scientific Research, Presenting Scientific Research.

MOD537 Fiber Art 3+0 7.5
Introduction to the history of contemporary textile arts; Mini Textile Applications with Vegetable Fibers: Production of superficial and three-dimensional free and modular forms using fiber-cored structures, Examination of contemporary fiber arts examples, Contemporary interpretations in textile arts, Space and fiber art relations, Yarn and fabric usage in fiber arts: Yarn and fabric usage examination of contemporary art application examples, contemporary textile art applications in accordance with design principles and principles are realized, surface and three dimensional applications obtained by using yarn and fabric are examined.

MOD538 Fashion Sociology 3+0 7.5
MOD 538 Fashion Sociology 3+0 7,5 Fashion and Dress: Etymology of fashion, early fashion research; Fashion and Social Change: The role of fashion in social change, Symbols of Status, Symbols of belonging; Fashion and Gender: Dress and fashion differentiation, Fashion and ambiguity; Fashion Industry: Historical development of fashion industry, Fashion industry as a cultural industry, Fashion cities and events; Fashion Media: Fashion journals, The myth of designer, Gatekeeping.

MOD539 Fashıon Desıgn Presentatıon and Graphıc Desıgn Relatıon 1+2 7.5
Presentation Fashion Design: Research keywords, Reading, Writing, Illustrative overview, Narrative technique graphic; Thematic Approach: Creating the story, Key words and the symbolic approach, Keywords, and surface design; Graphic Expression in Clothing Design: Fashion design and graphic perception; Presentation of Fashion Design and Illustration : The transfer graphic of the story; The Importance of Graphical Perspective: The methodological approach in the presentation of fashion design; Textile to the Surface of Transfer; Transfer Applications for Graphic; Perceptual Lecture.

MOD541 Textile and Garment Comfort 3+0 7.5
Human-Garment-Environment Interactions; The Concept of Textile and Garment Comfort; The Importance and Components of Textile and Garment Comfort; The Attitude and Expectations of Users Towards Textile and Garment Comfort; Classification of Comfort; Factors Affecting Textile and Garment Comfort; The Effect of Material, Manufacturing Technology and Material Construction on Comfort Properties; Comfort Properties of Textile Materials In the Form of Fibre, Yarn and Fabric; Garment Comfort Test Methods.

MOD543 Applied Studies on Natural Dyeing 2+1 7.5
Sustainability Practices in Textile Dyeing; Principles and Current Status of Natural Dyeing; Sources, Types and Extraction of Natural Dyes; Definition, Classification and Use of Mordans in Natural Dyeing, Determination of Suitable Dyes for Cellulose, Protein and Synthetic Fibers and Relevant Pre-treatments, Extraction of Dyes; Preparation and Dyeing of Different Textile Materials, Optimization of Pre-treatment, Extraction, Mordaning and Dyeing Processes; Measurement of Fastness Properties; Making Proposals to Improve Fastness Properties

MOD545 Art and Fashion Concept in Design 3+0 7.5
Art, Design and Fashion Throughout History; Art Movements: Modern art movements; Design Schools: Bauhaus, Arts and Crafts movement; The industrial Revolution and Development of Fashion Industry; Research on Fashion Movements and Fashion Styles: Anti-Fashion movements, The relationship of subculture fashion with art and design; Analysis of Interaction Between Art, Design and Fashion Throughout History; Evaluation of Research Results.

MOD592 Seminar 3+0 7.5

MOD701 Research in Area of Specialization 3+0 4.5

MOD702 Research in Area of Specialization 3+0 4.5

MOD790 Thesis 0+1 30.0

PLT501 Aircraft Performance and Operation Analysis 3+0 7.5
Basic Definitions: Standard atmosphere, General performance requirements, Forces acting on an aircraft and axis; Symmetrical Steady State Flight: Horizontal flight and cruise performance characteristics, Climb performance characteristics, Descend and glide performance; Take-off: Take-off distance and take-off performance characteristics; Landing: Landing distance and landing performance characteristics; Curvilinear Flight: Turn performance and characteristics, Climbing and descending turns, Helicoidal and spiral climb, Descend and spin, Spin recovery; Cruise Range and Endurance.

PLT503 Aviation Research 3+0 7.5
History of Aviation Research: American aviation research, NASA and FAA, European aviation research and space strategy, Turkish aviation research; Needs for Aviation Research; Aviation Research and Development Vision; R&D Politics and Strategy; R&D Methodology; R&D Resources: Human resources, Finance, Technical infrastructure; Know-How, Regulations, etc.; Innovation and Entrepreneurship; Intellectual and Industrial Property Rights; R&D Culture and Education; R&D Organization and Cooperation; R&D Software; R&D Strategic Management; Relationship Between R&D and Economic Development; Innovations in Aviation Industry; Sample Research Studies.

PLT504 Aviation Safety Cases 3+0 7.5
Classification of Factors Affecting Aviation Safety; Flight Operation-oriented Accidents: Flight crew, Communication and procedural errors; Aircraft-oriented Accidents: Design and material failures; Maintenance-oriented Accidents: Personnel and procedural errors; Airport/Air Traffic Control-oriented Accidents: Midair and runway collisions; Accidents due to Meteorological and Geographical Conditions; Security-oriented Accidents: Terrorist attacks and security errors.

PLT505 Statistical Methods in Aviation 3+0 7.5
Using Statistical Analysis in Airline Operations; Data Collection and Analysis; Basic Statistical Concepts: Summary of numerical knowledge, Probability, Sampling, Point forecast, Period forecast, Hypothesis testing, Correlation and regression analysis, Variance analysis; Using Software in Analysis; Analysis of flight data, Data collection, Data categorization, Analysis, Reports.

PLT506 Airlines 3+0 7.5
Concept of Airline Transportation; Economic Characteristics of Airlines; History of Air Transportation; Airline Deregulation; Airline Operation Costs; Airline Marketing; Product Planning and Pricing; Demand for Air Transportation and Factors Affecting the Demand; Traditional Carriers, Charter Carriers, Regional Carriers, Low Cost Carriers, Air Cargo Carriers.

PLT508 Aircraft Performance Optimization 3+0 7.5
Maximum and Minimum Theory, Maximums and Minimums of Multi-Variable Functions, Lagrange Multipliers; Optimization; Optimization Conditions of Performances in Steady State Flight; Turns in Level Flight; Maximum Rate of Climb in a Constant Radius Helicoidal Climb; Maximum Bank Angle in a Helicoidal Climb; Minimum Radius of Turn in a Helicoidal Climb; Maximum Angular Velocity in a Helicoidal Climb; Calculation of Flight Altitude for Maximum Level Flight Speed; Maximum Range for a Given Flight Altitude; Optimization of Rate of Descent in a Helicoidal Descent; Minimum Flight Path Angle in a Helicoidal Descent.

PLT509 Advanced Flight Mechanics 3+0 7.5
Basic Definitions - Aircraft Control Surfaces and Characteristics; General Conditions of Equilibrium and Stability; Longitudinal Static Equilibrium and Stability; Symmetrical Maneuver Analysis; Aircraft Equations of Motion; Analysis of Symmetrical Maneuvers by Non-dimensional Equations; Longitudinal Static Stability Analysis; Longitudinal Dynamic Stability Analysis; Fixed Stick Stability Analysis; Free Stick Stability Analysis; Study of Longitudinal Behavior and Unsymmetrical Movements; Lateral Equilibrium and Stability; Equilibrium and Stability Analysis of Special Flight Maneuvers.

PLT511 Aircraft Icing 3+0 7.5
Introduction; Meteorological Aspects; Icing Physics; Parameters Affecting Icing; Ice Accre-tion Prediction: Supercooled droplet trajectories, Droplet impact, Droplet collection efficien-cy, Thermodynamic analysis, Ice growth rates, Extended Messinger Model, Runback water 2-D and 3-D ice accretion simulation, Supercooled large droplets, Icing related to ice crystals, Icing certification (Federal Aviation Regulations, Part 25, Appendix C, O, P).

PLT512 Data Science in Aviation 2+1 7.5

Basic Concetps of Data Science: Data, What is Data science and what it is not?; Tools for Data Science: R, Python, SQL; Data Types; Statistics and Probablity Recap: Sample, Dependent and Independant Variable, Correlation, Probality Distributions, Conditional Probablity and Bayes Theorem; Hypothesis and Inference: Hypothesis Testing, p-value, Confidence Intervals; Data Visualization:matlotlib, seaborn, Working with Data: Exploring and Manuplating Data;Regression: Simple Linear Regression, Multiple Regression, Logistic Regression; Classification; Machine Learning: Basic Concepts, Methods, Supervised,Unsupervised and Reinforced Learning; Network Analysis, Aviation Applications.

PLT513 Mathmematical Calculations in Aviation 3+0 7.5

Ordinary Differential Equations: Modeling, Geometric meaning, Existence and uniqueness of solutions, Homogenous linear equations, Euler-cauchy equations, Nonhomogenous linear equations, High order linear equations, Phase plane, Laplace transforms; Linear Algebra and Vector Calculus: Linear system equations, Vector spaces, Eigenvalue problems, Vector differential calculus, Grad, Div, Curl; Partial Differential Equations: Fourier series, Integrals and transforms; Complex Analysis: Power series, Taylor series, Laurent series and Residue Integration, Conformal Mapping.

PLT515 Aircraft Sequencing and Scheduling Modelling 3+0 7.5

Basic Concepts of Air Traffic Flow Management; Problems in Air Traffic Flow Management; Modelling of Air Traffic Flow Management; Fundamentals of Sequencing and Scheduling and Notation; Aircraft Sequencing and Scheduling Techniques; Models in Aircraft Sequencing and Scheduling: Deterministic and metaheuristic; Distribution and Notation of Arrival and Departure Traffic; Modelling and Analysis of Runway Capacity; Single and Multiple Runway Modelling for Aircraft Sequencing and Scheduling; Aircraft Sequencing and Scheduling Modelling in Point Merge System.

PLT517 Forecasting Methods in Aviation Operations 3+0 7.5

Aviation Operations and Forecasting; Overview of Forecasting Methods; Estimation Methods: Naive, seasonal naive, arithmetic average, moving average; Adaptation of Forecasting Methods to Aviation Activities; Estimation Methods Analysis: Residual analysis, Box-Pierce test, Ljung-Box test; Application of Forecasting Methods to Aviation Operations; Time Series; Regression Analysis in Time Series: Linear trend method, quadratic trend method, cubic trend method and exponential trend method; Forecasting on Passenger Demand; Forecasting on Air Freight; Forecasting on Aircraft and Seat Capacity.

PLT519 Machine Learning in Aeronautics 2+1 7.5

Bacis Concepts: Artificial Intelligence, Machine Learning,Deep Learning, Supervised Learning, Unsupervised Learning, Reinforcement Learning, Jupyter / Colab Environment; Python Recap:Data Types,IO,if-elif,while-for, functions, Pandas, Numpy, Matplotlib,Seaborn; Linear Algebra and Probability Recap: Vector, Matrix, Tensor, Python Calculations,Bayes Rule,Probability Distribution Functions;Linear regression: Data Preparation, Simple Regression,Multiple regression; Error Metrics: R- squared, MAE, MSE; Logistic Regression: Sigmoid Function, F1 score, Confusion Matrix, ROC; Decision Trees: Basics,Terminology, Gini index, Entropy; Regularization: Overfitting, underfitting, Lasso, Ridge; Ensemble Learning: XgBoost; Unsupervised Learning: Clustering, K-means, Sihoutte Score; Introduction to Deep Learning: Artificial Neural Networks (ANN), Convolutional Neural Networks (CNN); Aeronautics Applications.

PLT521 Operations Research in Aviation 3+0 7.5

Operations Research (OR): Basic concepts of OR; Area of Application; Mathematical Modelling in OR: Linear and Interger Models and Modelling; Network Flow Models; OR in Airline Operations: Flight Scheduling, Fleet Assigment, Aircraft Routing, Crew Scheduling, Disruption Management, Revenue Management, Fuel Management; OR in Airport Operations: Surface Managegemet, Runway Scheduling, Taxi Scheduling, Gate Assigment.

PLT592 Seminar 3+0 7.5

PLT790 Thesis 0+1 30.0

PSİ606 Psychology in Architecture Design 3+0 7.5

Psychology- Architecture and Space Relations; Territory, Personality- Identity, Personal distance, Social distance, Privacy; Psychology of the user: The effects of spaces on people, Examples on the topic, Private and unprivate spaces, Analysis of Different Spaces; Psychology of the architect: Studies on designers and their approach.

PZL532 Sport Marketing Management 3+0 7.5

Introduction of Marketing Rules and Applications in Sport; Characteristic of Sport Marketing; Sport Marketing Management Process; Strategies in Sport Marketing Management; Planning and Object Determining; Sport Consumer Behaviors; Strategies of Segmentation and Positioning in Sport Marketing; Marketing Mix and its Strategies in Sport; Sponsorship and Promotion Techniques in Sport Marketing; Coordination, Application and Control of Marketing Management Functions; Current Developments in Sport Marketing Management; Case Studies in Sport Marketing.

PZL533 Integrated Marketing Communications in Sport 3+0 7.5

Sport and Communication; Concept and context of communication, Communication theories, Globalization and communication, Sport and media relation, Communication dimensions of marketing communication mix in sport, The process of IMC in sport. Applications of Marketing Communication Components in Sport; Sport public relation and management, Advertising activities in sport and management, Personal selling in sport, Sales promotion mix in sport and management, Direct marketing in sport, Sport sponsorship, Event management in sport. Sport Brand Communication; Case studies, Brand placement in sport. Marketing. Communication Planning Process in Sport.

PZL610 Consumer Behaviours 3+0 7.5

Introduction to Consumer Behaviour: Importance of consumer behaviour in marketing, Concept and characteristics of consumer behaviour, Interdisciplinary approach in consumer behaviour, Common pattern of consumer behaviour, Relationship between consumer behaviour and marketing strategy; Psychological Effects: Learning and memory, Motivation and interest, Perception, Manners and changing of manners, Personality, ego and lifestyle; Sociocultural Effects: Councelor groups, Family, Personal effects, Social class, Culture; Consumer Purchasing Process; Society and Consumer Behaviour: Protection of consumer and conscious of consumer.

REK 629 Urban Life and Recreation 3+0 7.5

Environment, City ant Urbanization; City and Urban Space; Urban Life and Stress; Life Quality, Stress and Recreation; Urban Space and Recreation; Urban Landscape and Recreation; Leisure Requirements and Recreatio; Recreation Activities and Participation; Recreation and Participants with Special Needs; Design of Recreation Areas and Spaces; Recreation and Accessibility for All.

REK501 Recreation Management and Techniques 3+0 7.5

The Concept of Recreation; Recreation Theories; Causes Affecting the Development of Recreation Activities; Recreation Management; Recreation Management Process; The Principles of Recreation Management; Recreation Organizations; Leadership in the Recreation Organization; Management Approaches to the Recreation Organizations; Indoor Recreation Management; Outdoor Recreation Management.

REK511 Academic Writing, Publishing and Presentation Techniques 3+0 7.5

Preparing Scientific Texts: General spelling and rules, Formal structure and technical rules, Section of scientific text; Preparing Thesis Proposal and Writing Thesis; Scientific Article Writing: The structure of the article, Deciding the heading, The clues of writing the abstract, Deciding keywords, Introduction, Theoretical Framework/Literature Review, Research method, Data analysis and reporting the findings, Discussion and conclusion, Acknowledgement, References, Use of software in preparing the reference list; Mistakes in Writing Article; Formatting The Article for a Journal; Deciding The Journal: Submitting the article to the Journal, Responding to editor and referee feedbacks; Planning and Preparing Presantarion for Congress: Focussing on the aim and content of the presentation, Supporting the presentation with audio-visual tools; The Researcher's Self-Preparation.

REK512 Statistical Decision Making and Data Analysis in Leisure Research 3+0 7.5

Data in Statistics: The concept and importance of data, Types of data, Features of data types; Data Description and Classification Criteria: Location criteria, Average criteria, Diffusion criteria; Variable in Data Analysis: Variable types, Importance of variable types in statistical decision; Parametric and Nonparametric Test Assumptions: Data type, Sampling feature and number, Variance Homogeneity, Normal Distribution; Hypothesis Tests: One-sample tests, Independent-two-sample tests, Comparison of two independent groups, Dependent two-sample tests, Comparison of more than two dependent groups, Correlation tests; Validity Tests: Content validity, Reference-based validity, Structure validity; Reliability Tests: Parallel tests, Test-retest, Alpha coefficient, Dividing a test into two halves, Correlation between items, Kr method; Original Practices.

REK513 Project Management Techniques 3+0 7.5

Introduction to Project and Project Management; What is the project?, Classification of projects, What is project management ?, The main point of project management, Project shareholders, Project life cycle, Launch of the project; Project charter, As much as the shareholders, Project launch meeting, Project Planning; Time Management, Planning process, Creating an effective project team, Types of costs, Budgeting, Risk management and planning, Project execution; Project management, Techniques, Management and approaches, Quality management in the project, Monitoring and Control of the Project; Project monitoring and control, Risk monitoring & control, Project closure.

REK514 Commercial Recreation Industry 3+0 7.5

Basic Concepts of Commercial Recreation Industry; Historical Development of Commercial Recreation; Reflections of Commercial Recreation in the World; Reflections of Commercial Recreation in Turkey; Capitalism, Leisure and Recreation; Economic Dimensions of Commercial Recreation Industry; Sectors of the Commercial Recreation Industry: Private, sector, Public sector, Voluntary sector; Main Areas where Activity and Activity are Structured; Service Organizations and Applications in Commercial Recreation; Basic Characteristics of Recreation Expert; Research Subjects in Commercial Recreation; Points to Consider in Commercial Recreation Research; Techniques Used in Commercial Recreation Research; Applications in Commercial Recreation Research.

REK515 Recreation Research in Local Governments 3+0 7.5

Concept of Local Government Recreation; History of Local Government Recreation in Turkey and in the World; Recreation Role and Importance of the Local Government; Local Government Recreation Services in the World and in Turkey; Planning Recreation Services in Local Governments; Human Resources Management in Local Government Recreation; Volunteering in Recreation Services in Local Governments.

REK516 Quality Management in Recreation 3+0 7.5

Quality Concept; Quality Management and Development Process: Quality management approaches; Total Quality Management; Basic Elements of Total Quality Management; Techniques Used in Total Quality Management: Benchmarking, PDCA circle, Quality control circles; Service Quality: Quality in recreation services, Service quality dimensions in the recreation industry, Measuring service quality in recreation industry; Customer Orientation in Quality Management; Leadership in Quality Management; Human Resources Management in Quality Management.

REK517 Gender and Sport 3+0 7.5

Gender and Basic Concepts; Theoretical Approaches to Gender; Historical Development of Gender Studies in Sports; Woman in the History of Sports; Masculinity and Sport; Gender in Sports Institutions; Gender in International Sports Policy; Historical Process of Women's Participation in Sports and Physical Activity in Turkey; Female Body in Sports; Woman in Sports Media.

REK518 Employee Recration Studies 3+0 7.5

The Concept Employee Recreation; Employee Recreation Programs; Employee-Centered Approaches in Employee Recreation; Employer-Centered Approaches in Employee Recreation, Existing Studies in the Scope of Employee Recreation; Employee Recreation and Employee Productivity: The Factors That Affect Employee Productivity on the Basis of Recreational Activities; Participants in Employee Recreation Studies.

REK519 Recreation and Brand Management 3+0 7.5

Changing Competition and Brand: Brand and Branding Process from Past to Present; Basic Concepts of Brand: Associations, Awareness, Image, Personality; Brand Management in Sports: Brand identity planning models in sports, Communication strategies, Brand positioning and factors which are affecting brand positioning in sports; Brand Management and Integrated Communication in Sports: Characteristics of sports consumers and brand, Corporate communication and brand management; Case Studies for Sports Brands.

REK520 Body Composition and Wellness 3+0 7.5

Body Composition; Body fat mass, Fat free mass; Body Composition Assessment: Total Body, body segmen; Common Techniques To Assess Body Composition; Hydrostatic Weighing, bioelectrical impedance analysis, air-displacement

plethysmography, dual-energy X-ray absorptiometry, skinfold and girth measurements; Effect of Body Composition on Performance Sports; Individual sports, team sports.

REK521 Customer relationship strategies in recreation 3+0 7.5

Relationship marketing concept; Aims of relationship marketing; Relationship width; The concept of relationship quality; Relationship composition; Relationship strength; The concept of relationship activity; Relationships between relational marketing and performance outcomes; Traditional marketing; Differences between traditional marketing and relational marketing; Concept of management of relations with customers; The goals of customer relationship management; Relationship management with customers in recreation; Electronic customer relationship management strategies in recreation; Customer relations management strategies applied in recreation service facilities and organizations.

REK523 Motor Development and Physical Fitness in Individuals with Special Needs 3+0 7.5

Basic Concepts: Motor development, Motor control, Motor learning, Motor skill, Motor performance; Motor Development Stages; Motor Development Theories; Motor Learning Principles; Classification of Motor Skills; Physical Fitness; Basic Components of Physical Fitness: Aerobic function, Body composition, Musculoskeletal function, Agility, Reaction, Balance; Body Awareness and Posture.

REK592 Seminar 3+0 7.5

REK611 Rekreation Policies 3+0 7.5

Choosing Leisure: Social theory, class and generations; Outdoor Recreation and the Environment; Television, Deregulation and the Reshaping of Leisure; Leisure, Gender and the Citizenship: New leisure culture; Risky behaviors in leisure and young people; States, Markets and New Media; Web 4.0: Mashing Up Work and Leisure; Tourism and Transformation; Sport and Lifestyle: Politics in Leisure Activities; Music and Leisure in an Era of X Factor and Digital Pirates; Reflections of New Leisure Policies; Leisure Policies in Turkey.

REK613 Psycho-Social Issues In Leisure Research 3+0 7.5

Relationship Between Psychology And Leisure: Personality and leisure, Subjective well-being and leisure, Satisfaction and leisure, Emotional disorders and leisure, Stress and the role of leisure in stress management; Relation of Sociology and Leisure: Gender and leisure participation, Socio-economic factors and leisure participation, Social problems and leisure participation; Psychosocial research with theoretical basis: Basic theories of psychology and leisure research, Basic sociology theories and leisure research; Specific Applications In Leisure-Time Psycho-Social Issues; Academic Research On Psycho-Social Issues For Leisure.

REK615 Experimental Practicies in Recreation and Leisure Research 3+0 7.5

Experimental Research Model: Definition of experimental research, Types of experimental research, Differences of experimental research, Advantages and disadvantages; Variable in Experimental Research: Variable types, Variable control; Validity and Reliability in Experimental Research: Internal and external validity, Reliability; Experimental Research Model Studies: Experimental research samples from different fields, Examples from the field of sports sciences, Examples from the field of leisure and recreation; Planning.

REK617 Technology Based Leisure 3+0 7.5

Leisure in Digital Age; Electronic Leisure; Virtual Leisure; Leisure and Internet; Leisure and Digital Games: Active video games, Computer games; Leisure and Social Media; Home-based Digital Leisure; Digital Leisure Addiction Model; Artificial Intelligence Applications and Leisure; The Effects of Technology Based Leisure: Positive effects of technology based leisure, Negative effects of technology based leisure; The Place of Digital Applications in Research in the Field of Leisure.

REK619 Risk Management in Recreation 3+0 7.5

What is Risk: Key concepts; Distinctive Characteristics of the Sport and Recreation Managing Risk; An Overview of Risk Management Process for Recreation Activities: Defining the scope of the risk management activities; Risk Assessment; Components of a Risk Techniques and Approaches to Assessing Risks; Analyze the Risks: Types of analysis measurement and scales; Evaluate the Risks; Risk Tolerance, Risk Treatment and Preparing and Implementing a Risk Treatment Plan; Monitoring and Review; Risk Management Performance: Elimination of the risks in sports and recreation, Measurement of risk perception and measure instrument: indoor and outdoor; Trends in Risk Management Sector; Relationship Between Recreation And Perception Of Personal, Social And Cultural Risk.

REK621 Human Resource Management in Recreation 3+0 7.5

The Importance of Human Resources in Recreation; Volunteers and Volunteering in Recreation; Professionals and Professionalism Concepts; Customers as Human Resources in Recreation Services; Abilities and Personality; Values and Motivation; Organizational Justice; Job Design; Staffing and Career Considerations; Leadership; Performance Appraisal; Reward Systems; Internal Marketing in Recreation Services.

REK623 Leisure Experience Design and Management 3+0 7.5

Experience Concept: Experience from a marketing perspective, Tourism experience, Leisure experience; Leisure Experience Stages: Decision making phase, On-site experience, Recollection/Reflection phase; Expanded Leisure Experience; Leisure Experience Management Model; Leisure Experience Design: Experience value curve, Design phases of experience; The Measuring of Leisure Experience; Factors Related to Leisure Experience; Leisure Experience Quality; Factors Related to Leisure Experience Quality.

REK625 Leisure Consumer Psychology and Behavior 3+0 7.5

Psychological Bases of Consumption Behavior; Consumption Behavior and Related Theories; Consumption and Identity; Hedonic Consumption Psychology; Consumption Gender; Leisure Consumption in Digital Era; Consumer Purchasing Behavior; Internal Effects on Consumer Behavior; External Effects on Consumer Behavior; The Emergence of the Need; Researching Information; Evaluation and Selection of Alternatives; Purchasing; Post consumption Intention.

REK627 Sustainability and Recreation 3+0 7.5

Introduction to Sustainability: Basic dimensions of sustainability, environmental sustainability, social sustainability, economic sustainability, sustainable development; Relationship between Sport and Sustainability; Relationship between Recreation and Sustainability; Social Sustainability and Recreation, Environmental Sustainability and Recreation, Economic Sustainability and Recreation, Sustainability in Sports and Recreation Activities; Sustainable Approaches in Sports and Recreational Organizations and Event: sustainability practices in national and international organizations and events, case studies.

REK631 Health and First Aid 3+0 7.5

First Aid and Emergency Care; Basic Applications in First Aid; First Aid in Respiratory, Heart and Circulatory System Emergencies; Emergency Situations and First Aid in Schools: First aid in shock, First aid in bleeding, First aid in injuries, First aid in poisoning; First Aid in Spine Injuries; First Aid in Upper Extremity Injuries; First Aid in Lower Extremity Injuries; First Aid for Sprains; First Aid for Students with Special Needs.

REK692 Seminar 3+0 7.5

REK701 Research in Area of Specialization 3+0 4.5

REK702 Research in Area of Specialization 3+0 4.5

REK790 Thesis 0+1 30.0

REK890 Thesis 0+1 30.0

REK890-0 Thesis(Thesis Proposal) 0+1 30.0

REK901 Research in Area of Specialization 5+0 7.5

REK902 Research in Area of Specialization 5+0 7.5

RYL502 Entity in Charge of Maintenance and Certification for Railway Vehicles 3+0 7.5
Quality Management System; Maintenance Management; Relationship and Responsibilities and of Main Actors in ECM Certification Process; Main Actors Responsibilities in Operation of Railway Vehicles; Maintenance Management Systems Before ECM Regulation; ECM Business Models; Management; Maintenance Development; Fleet Maintenance Management; Maintenance Supply; Relationship Between ECM Functions; Purpose of Maintenance Workshop Certification; Certification Process; Checklist for Evaluation of Maintenance Workshops; Procedure Example.

RYL503 Certification of Railway Vehicles 3+0 7.5
Interoperability; TSI; Basic Requirements; ERA; OTIF; UTP; Subsystem; Interoperability Constituent; Actors in the Certification Process; EC Verification of Railway Vehicle as Subsystem; Certification Process of Railway Vehicle Constituents; Notified Body (NoBo); Nando; NB Rail; National Rules; Notif-IT; RDD; DeBo; DDGM; Evaluation Modules; Technical File; APS; Accreditation; ERADIS; NSA; National Vehicle Registration (NVR); IRIS.

RYL504 Energy Management in Rail Systems 3+0 7.5
Energy Terminology: Energy units, Exergy analysis, Energy saving; Measurement and Control: Thermal Value Measurement, Maintenance of Measuring Devices; Turkey and the World Energy Outlook on Renewable Energy; Energy Consumption in Rail Systems; Energy Saving: Comparison of fuels; Energy Efficiency: Energy Efficiency in Transportation; Energy Analysis; Energy Recovery in Rail Systems; Energy Analysis Applications in Rail Systems: Energy flow diagrams, Energy scanning / audit.

RYL505 Introduction to Railway Vehicle and Track Interaction 3+0 7.5
Relationship of Wheelset and Track; Characteristics of Wheel-Rail Contact Geometry; Vehicle Run in a Straight Track; Vehicle Run Through a Curve; Vehicles with Tilting Technology; Vehicle Guiding Through a Curve; Safety Verification Against Derailment; Rail Vehicle Suspension System; Mathematical Expressions of Suspension Elements .Mathematical Expressions of Suspension Elements. Mathematical Expressions of Suspension Elements.

RYL506 Urban Rail Transit System Design and Livable Cities II 3+0 7.5
Urban Rail Transit Stations; Urban Vehicle Units, Array and Configurations; Operations, Performance, and Costs: Vehicle/Train travel control and automation, Performance characteristics of rail modes, Rail transit costs; Urban Rail Transportation System Networks, Lines and Organizations; Operating Elements: Lines, networks, stops and stations, Vehicles, transportation units and fleet, Intervals and frequencies, Capacity, Travel time and speed; Rubber-Tired Rapid Transit; Present and Future Role of Rail Transit.

RYL507 Dynamics of Railway Systems 3+0 7.5
Introduction to Dynamic Analysis; Numerical Methods for Finding Dynamic System Response; Vehicle and Rail Models; Ray-Wheel Interaction: Geometric interaction, Normal interaction, Tangential interaction; Dynamic Response of a Wheel Set; Dynamic Response of a Rail Vehicle; Dynamic Response of Vehicle to Curve; Special Topics in Rail System Vehicle Dynamics; Experimental Study on Rail System Vehicles.

RYL508 Design of Experiment 3+0 7.5
Use of Experimental Design and Statistics in Scientific Studies; Descriptive Statistical Techniques: Means, Mode, Median, Standard deviation, Variance, Measures of distribution, kurtosis and skewness; Distributions and Hypothesis Testing: Z-test, T-test, F-test, Analysis of variance; Regression and Correlation; Teaching the Use of Minitab Program; Modern Experimental Design Methods; Partial Factorial; Fully factorial; Taguchi Experimental Design: Taguchi Experimental Design Applications.

RYL509 Diagnostics and Monitoring in Railway Systems 3+0 7.5
Introduction; Fundementals of Diagnostics and Prognostics; Mechanical Vibration; Preventive / Predictive Maintenance; Vibration Analysis; Transducers; Vibrodiagnostics; Acoustic Diagnostics; Model Based and Data Driven Methods; Stationary Techniques in Railway Vehicle Diagnosis; Wayside Techniques in Railway Vehicle Diagnosis; Wheel Defects and Detection; Bearing and Gearbox Fault Detection; Classification of Faults.

RYL510 Air Conditioning and Ventilation 3+0 7.5
Basic concepts; Psychometry: Humid air, Relative humidity and enthalpy, Wet and dry thermometer, Psychometric diagram; Air Conditioning Process and Cycles; Coolers and Cooling Cycles; Outdoor Design Conditions and Interior Design Criteria; Load Calculations; Refrigeration Components: Compressor, Condenser, Evaporator and flow control tools; Heating Systems; Cooling Systems; Thermal Storage Systems; Ventilation System Principles.

RYL511 Urban Rail Transit System Design and Livable Cities I 3+0 7.5
Classification of Transportation Modes; The Family of Rail Transit Modes: Categories and Descriptions: General characteristics, Definitions and characteristics of individual rail modes; Urban Rail Vehicles: Types and basic components, Bogies, trucks and mechanical/ electrical equipment, Vehicle body, Review of characteristics of different vehicle models; Urban Rail Transit Ways: Geometric elements, Track superstructure, Rights-of-way; Urban Rail Transit Stops and Yards.

RYL512 System Identification in Railway Systems 3+0 7.5
Introduction to Stochastic and Deterministic Processes; Correlation Analysis; Nonparametric Identification Methods; Spectral Estimation and Analysis: Application of Spectral Estimation for Fault Diagnosis of Gears in Traction Motors, Fault Tracking and Diagnosis of Bogies by Spectral Estimation and Analysis; Input Design; Pseudo-Random Series; Least-Squares and Maximum Likelihood Methods; Linear Predictors: Ar, Arma, Kalman; Iterative Estimation Methods; System Identification for Pantograph Simulations; Analysis of Breakdown Frequencies and Reliability of Railroad Vehicles; Analysis of Railroad Traffic Frequency and Congestion; Passenger Flow Estimation.

RYL513 Numerical Methods in Optimization 3+0 7.5
Introduction to Numerical Methods; Fundamental Concepts in Linear Algebra; Inroduction to Nonlinear Equations; Iterative Methods for Solution of Nonlinear Problems; Interpolation; Various Solutions of Differential Equations: Euler Method, Runge-Kutta Method, Adams Method; General Definition of An Optimization Problem; Simplex Method; Gradient Methods; Constraint Optimization Problems; Heuristic Methods 1: Genetic Algorithm; Heuristic Methods 2: Particle Swarm Optimization; Heuristic Methods 3: Tabu Search; Heuristic Methods 4: Simmulated Annealing.

RYL514 Safety Management Systems 3+0 7.5
Concepts of Danger and Risk; Definitions of Danger and Risk; Risk assessment; Risk mitigation methods; Emergency cases; Planning of emergency cases; Safety culture; Importance of Safety Management in Transportation; National Regulations regarding Transportation Safety; International Regulations regarding Transportation Safety; Duties, Authorizations and Liabilities of the Institutions and Organizations Responsible for Transportation Safety; Physical Security Precautions regarding Transportation Safety; Human Factor in Transportation Safety; Technology regarding Transportation Safety; Track-Trace and Baggage Scanning Systems in Passenger Transportation; Freight-Cargo.

RYL515 Selected Topics in Vehicle Design I 3+0 7.5
Rolling Stock; Variables of Railway Vehicle Design; Characteristics of Railway Vehicles; Vehicle Body Design: Running gear connection, Braking system, Couplers; Wheelset Design: Production of axles, Wheel design and production, Wheel wear, Suspension design; Contemporary Two-axle Freight Bogies; Many-axled Freight Bogies; Passenger Cars and Running Gear; Contemporary Types of Two-axle High-speed Bogies; Train Couplers; Axle-box Guiding; Operational Safety: Safety against derailment; Comfort; Interoperability; Environmentally Friendly Design.

RYL516 Special Topics in Fluid Mechanics 3+0 7.5
Fluid Characteristics; Fluid Statics; Basic Concepts of Flow: Streamlines and Stream Tube, Steady State Flow and Transient Flow, Laminar and Turbulent Flow, One Dimensional Flow; Viscous Liquids; Drag and Lifting Force; Dimension Analysis and Similarity Law; Measurement of Flow and Flow Rate; Ideal Fluids; Compressible Fluids; Transient Flow; Visualization of Flow: Classification techniques, Experimental methods, Computer aided methods.

RYL517 Vehicle Suspension System Design 3+0 7.5
Railway Vehicle Suspension Systems; Function of Suspension Systems; Components of Suspension Systems; Dependent and Independent Suspension Systems; Semi-active and Active Suspension Systems; Air Spring Based Suspension Systems; Kinematic and Kinetic Analysis of Suspension Systems; Instant Rotational Centers; Response of Impact Loading in Suspension Systems; Modal Analysis of Suspension Systems; Linear and Non-linear Suspension Systems; Analytical Modelling of Suspension Systems; Analysis and Design of Suspension Systems.

RYL518 Selected Topics in Vehicle Design II 3+0 7.5

Introduction to Motor Vehicles; Locomotive, Railcar, Tramway and Metro; Rail-wheel Adhesion: Transversal and longitudinal adhesion characteristics, Hertz theory, Creep, Driving dynamics-adhesion relationship; Power Transmission: Mechanical, Hydrostatic, Hydro dynamical, Electrical, Gearbox and connection; Wheelset Drive for Different Drive Types and Different Loading Modes: Forces, Torsional and bending moments analysis; Bogie and Body Connections; Wheelset guiding and primary suspension, Secondary suspension, Wheelset drive systems: Carbody connection, Suspension, Strain analysis; Modern Locomotives and Light Rail Vehicles; Technical Layout Planning.

RYL519 Traction Control in Rail Vehicles 3+0 7.5

Basic Concepts: Traction, Braking, Power, Control; Ray-Wheel Interaction for Traction Control: Geometric interaction, Normal interaction, Tangential interaction; Traction Control and Holding Model in Braking; Introduction to AC and DC Motors and Drive Systems Used for Traction Control; Extraction and Investigation of Torsion Model for Traction Control and Braking of a Wheel Set; Traction Control Under Different Holding Conditions; Investigation of Longitudinal Movement of a Train Set by Traction Control.

RYL520 Vibration and Noise in Rail Systems 3+0 7.5

Vibration Analysis: Free, Damped, Forced Damped Vibration, Multi Degree Of Freedom Systems; Vibration Standards: International Standards for Machinery and Vehicles, International Standards for Railway Vehicles and Components; Vibration Isolation: Dynamic Damper, Isolator Selection; Driving Comfort and Vibration of Human Body: Vibration of Human Body and Related International Standards, Effects of Vibration on Human Body; Vibration Measurement; Vibration Measurement and Maintenance Planning; Noise in Rail Systems: Noise Sources, Railway Noise, Noise Measurement, Preparation of Noise Maps, Noise Barriers.

RYL521 Shell Structures 3+0 7.5

Shell Buckling Behavior and Design Criteria; Shell Modeling; Material Assumptions; Geometric Tolerances and Imperfections; Rules for Plastic Limit Assessment; Rules for Buckling Limit Evaluation with Numerical Analysis; Rules for Buckling Limit Assessment Using Design Stress; Evaluations for Some Special Shell Structures Operating Under Different Load Cases: Cylindrical shell structures, Conical shell structures, Spherical shell structures.

RYL522 Image Processing Applications in Rail Systems 3+0 7.5

Introduction; Detectable Faults on Railways: Wheel defects, Rail cracks and surface defects, Sleeper cracks and misalignment; Change Analysis; Signal Sampling and Quantization; Perspective; Digital Images: Binary, Gray-level, Color, Multispectral; Image Transforms: Geometric transformations, Intensity transformations; Image Restoration: Linear and non-linear filters, Spatial and frequency domain image restoration; Edge detection; Corner detection; Morphological operations; SIFT- keypoints; Object Recognition: Preprocessing, Feature extraction, Bag of words, K-means clustering, Fisher linear discriminant classifier, Naive Bayes classifier, Support vector machines.

RYL523 Tractive Systems 3+0 7.5

Basic Principles; Mechanics of Railway Transportation; Under Vehicle Design and Drive of Traction Vehicles; Brushed Traction Motors and Their Controls; Synchronous Traction Motors and Their Controls; Asynchronous Traction Motors and Their Controls; Electric Traction Vehicles for Main Service Line; Multi-System Traction Vehicles; Commuter and Light Rail Traction Vehicles; Brake Technology; Power Supply of Power Lines.

RYL524 Sensors and Actuators in Railway System 3+0 7.5

Expectations of system; Differences Between Open-loop and Closed-loop system; Introduction of Sensors and actuators; Important Parameters of Sensors; Temperature Sensor and Comparison; Magnetic Sensors; Mechanical Sensors; Hall Effect Sensors; Pressure and Strain Transducers and Strain Gauge; Audio Sensors; Hydraulic and Pneumatic Actuators; Types of Motors: DC and AC motors

RYL525 Signal Processing in Railway Systems 3+0 7.5

Definition of Signal Processing; Sampling; Analog-to-Digital and Digital-to-Analog Signal Transformations; Conversion From Time Domain to Frequency Domain; Signal Processing Methods for Vibration Analysis; Signal Processing Methods for Noise Analysis; Multidimensional Signals and Introduction to Image Processing; Image Processing Methods for Fault Diagnosis; Introduction to Data Classification Methods; Fault Classification; Introduction to Wavelet Transforms; Wavelet Transforms for Fault Diagnosis; Signal Processing Methods for Driver Safety; Signal Processing Methods for Analysis of Driver Behaviours.

RYL526 Corrosion and Surface Treatment 3+0 7.5

Corrosion, Principles of Corrosion; Types of Corrosion; Corrosion processes and Their types (chemical, physical, electrochemical); Types of Corrosion attacks; Particular Corrosion Environments. Corrosion Reactions a Corrosion Cells; Corrosions by Stray Current; Electrochemistry Protections; Electrochemistry Cells; Corrosion Resistance of Non-ferrous

Metals. Corrosion of Glass and Plastics; Surface Threatment - Metallic Surface Coatings, Electroplating, Non-metallic Surface Coatings, Enamelling, Organic Coatings (paintings), Paintings Testing; Non Conventional Surface Treatment - Diffusion coatings, PVD, CVD, Anodizing, Plastics Coatings; Corrosion Resistant Steels.

RYL527 Optimization in Railway Systems 3+0 7.5

Introduction to Optimization: Fundamentals, Models, Exact Solution Methods; Introduction to Metaheuristic Optimization; NP-hard problems, Necessity of Metaheuristic Optimization, Fundamentals; Single-solution based optimization algorithms: Simulated Annealing Algorithm, Tabu Search Algorithm, Implementation and Application to the Railway Systems; Evolutionary Algorithms: Fundamentals, Genetic Algorithms, Ant Colony Algorithms, Bee Colony Algorithms, Programming Algorithm and Application to the Railway Systems.

RYL528 Durability of Railway Materials 3+0 7.5

Examination of the Durability of Railway Materials and Its Plasticity; Breakdown Models of Materials; Fatigue Limits of Materials and Brittle fracture; Structural and Mechanical Characters of Materials; Choosing Suitable Rail Materials; Types of Railway Steels and Its Comparison; Wear, Fatigue and Breakdown Mechanism of Railway Steels; Methods for Improving Railway Steels and Its Limitations

RYL530 Transportation of Dangerous Goods on Railways 3+0 7.5

Definition of Dangerous Goods; Accidents in the Transportation of Dangerous Goods; National and international regulations on the Transport of Dangerous Goods on Railways; RID General Structure; RID Hazardous Material Classes; Packing Groups and Types of Dangerous Goods; Marking and Labeling of Packages; Types of Transportation of Dangerous Goods; Loading of Dangerous Goods and Characteristics of Transport Vehicles; Marking of Vehicles Carrying Dangerous Goods.

RYL531 Tribology of Wheel - Rail 3+0 7.5

Introduction to the Wheel - Rail Interface; Basic Tribology of the Wheel - Rail Contact; Contact Mechanic of the Wheel - Rail; Friction and Wear Simulation of the Wheel - Rail Interface; Rail Materials; Wheel Materials; Wear and Fatigue of Railway Wheels; Rail Wear; Fatigue of RailRail Damages; Rail Welds; Effect of Contaminants on Wear, Fatigue and Traction; Wheel - Rail Isolation; Maintenance of the Wheel - Rail.

RYL532 Electric Machines in Railway Systems 3+0 7.5

Induction Machines: Constructional properties, Equivalent circuit models of induction machines, Performance evaluation, Speed control techniques, Motor characteristics, Methods of starting induction motors, Linear induction motors; Traction Motors for Railway Vehicles; Single Phase Machines; Direct Current Machines: Constructional properties, Equivalent circuit models of direct current machines, Commutation and auxiliary poles, Compensation windings; Rotating Field Theory; Synchronous Machines: Equivalent circuit models of synchronous machines, Generator and motor operating conditions, Steady state power and angle characteristics.

RYL533 Data Analysis and Machine Learning in Rail Systems 3+0 7.5

Safety, Reliability, Quality and Test Data in Rail Systems; Introduction to Data Analysis; Fundamentals of Probability; Probability Distributions; Univariate and Multivariate Distributions; Estimation Theory; Maximum Likelihood Method; Supervised Learning; Linear Regression; Decision Trees; Artificial Neural Networks; Unsupervised Learning; Clustering; Principal Component Analysis; Hidden Markov Models; Bayesian Decision Systems; Importance of Data Analysis in Rail Systems; Machine Learning Applications in Rail Systems

RYL534 High Voltage Technique 3+0 7.5

Introduction to High Voltage Engineering; Conduction and Breakdown in Gases, Conduction and Breakdown in Liquid Dielectrics, Breakdown in Solid Dielectrics, Corona Discharges, Applications of Insulating Materials; Generations of High Voltages and Currents, Measurements of High Voltages and Currents; Overvoltage Phenomenon and Insulation Coordination in Powersystems; Non-destructive Testing of Materials and Electrical Apparatus; High Voltage Testing of Electrical Apparatus, Design, Planning and Layout of Hİgh Voltage Laboratories.

RYL535 Introduction to Railway Systems I 3+0 7.5

Rolling Stock and Equipments; Bogie and Wheels; Vehicle Suspension Systems; Wheel Arrangment; Pantographs; Maintenance Depots and Workshops; Basics of Brake Technology; Automotic Air Brake Systems; Straight Air Brake Systems; Brake Calculations; Track Infrastructure; Track Superstructure; Ballast; Sleepers; Rail; Rail Welding; Rail Fastenings; Curves; Turnouts; Gauging; Railway Engineering Structures; Viaducts; Bridges; Tunnels; Track Maintenance.

RYL536 Introduction to Railway Systems II 3+0 7.5

Railway Electrification Systems; Catenary Equipments; Maintenance of Overhead Lines; Railway Signaling Systems; Block Systems; Train Control Systems; ERTMS; ATS; Railway Communication Systems; Railway Traffic Systems; TSI; TMİ; Railway Transportation; Urban Rail Transit Systems; International Standards and Regulations; Liberalization and Restructuring of the Railway Sector.

RYL537 Soil Improvement and Seismic Slope Stability Analysis 3+0 7.5

Importance of Soil Improvement in Civil Engineering Applications; Soil Improvement Techniques: Deep compaction, Dynamic compaction, Preload, Stone column, Injection techniques, Compaction piles, Jet grouting, Deep mixing, Soil improvement by lime, cement and bitumen, Electro osmosis, Sand drain, Reinforcement concrete piles; Slope Stability and Geometric Definitions; Effects of Slope Movement; Slope Stability Analysis Methods; Geotextiles and Geosynthetics in Slope Stability.

RYL538 Infrastructure and Soil Dynamics in Rail Systems 3+0 7.5

Soil Structure and Texture; Earthquakes; Dynamic Loading and Vibration Principles: Fundamentals, SDOF Systems, Two DOF Systems and Basics of Wave Propagation; Stress-strain Behavior and Strength Properties of Soils Under Dynamic Loading; Shear Strength of Soils Under Dynamic Cyclic Loading; Behavior of Soils and Site Amplification; Elastic Behavior; Non-Linear Behavior; Soil Liquefaction and Analysis; Effects of Liquefaction and Liquefaction Related Settlements.

RYL539 Soil Investigation and Soil Mechanics in Risky Fields 3+0 7.5

General Definitions in Soil Mechanics; Soil Samples; Soil Classification and Index Properties: Soil moisture content test, Determination of soil consistency using the Atterberg Limits, Determining volumetric shrinkage of soil, Sieve analysis, Hydrometer test, Determining of soil density in situ, Specific gravity and relative density tests, Compaction-standard proctor test, Consolidation test, Permeability test, California Bearing Ratio test (CBR), Compressive strength test, Shear box test, Triaxial test.

RYL540 Transportation Economics 3+0 7.5

Fundamental Economic Concepts: Necessities, Goods and Services, Production Costs; Effect of Transportation on Economic Growth; Features of Transportation Industry; Sub-Systems of Transportation; Functions of Transportation; Supply, Demand and Equilibrium in Transportation; Factors Affecting Transportation Demand; Methods of Transportation Demand Forecasting; Internal and External Costs in Transportation Industry; Pricing in Transportation Industry; Transportation Policies in European Union; Criteria in the Selection Process of Transportation Systems and Analysis of Utility and Cost; Transactions of Transportation Systems with the Environment.

RYL541 Condition Assessment of Railway Ballast by Ground Penetratin Radar (GPR) Method 3+0 7.5

Railway Infrastructure; Functions of Ballast; Clean and Fouled (Spent) Ballast; Condition Monitoring Methods of Railway Infrastructure; Ground Penetrating Radar (GPR): History of GPR, Basics and fundamental working principles of GPR; Applications of GPR, Relative dielectric permittivity constant; Ballast Assessment with GPR: Distinguishing between clean and fouled ballast and maintenance/repair thresholds, Analysis of a case study from a sample railway infrastructure investigated by GPR, Determination of railway segments to be maintained, repaired and/or renewed as a result of analysis findings.

RYL542 Historical Development of Railways 3+0 7.5

Railway in the Ottoman Period; Ottoman Railway Construction Process; Stations; Locomotives; Passenger and Freight Wagons; Railways of Republic Period; Development process; Railways after 1950; Current state; Transportation Policies; Overview of Logistics, Railway Logistics, Overview of Rail Systems in Various Cities, Railway Logistics, Overview of Rail Systems in Various Cities.

RYL543 Field and Laboratory Tests of Soils Under Dynamic Loading 3+0 7.5

Fundamentals of Dynamic Loading; Geotechnical Soil Properties; Low Strain Tests: Seismic reflection test, Seismic refraction test, Suspension logging test, Steady-state vibration test, Spectral analysis of surface waves test, Seismic cross-hole test, Seismic down-hole and up-hole test, Seismic cone test, Resonant column test, Ultrasonic pulse test, Piezoelectric bender element test; High Strain Tests: Standard penetration test, Cone penetration test, Dilatometer test, Pressuremeter test, Vane shear test, Shear wave velocity test, Cyclic triaxial test, Cyclic direct simple shear test, Cyclic torsional shear test; Model Tests: Shaking table tests, Centrifuge tests.

RYL544 Investigation of Railway Infrastructure by Nondestructive Condition Monitoring Methods 3+0 7.5

Investigation Methods of Railway Infrastructure; Features of Nondestructive Methods: Advantages, disadvantages, application fields; Falling Weight Deflectometer Method; Sonic Echo Method; Impulse Response Method; Parallel Seismic Method; Ultrasonic Pulse Velocity Method; Ultrasonic Echo Method; Infrared Thermography Method; Spectral Analysis of Surface Waves Method; Ground Penetrating Radar (GPR)

RYL545 Introduction to Finite Element Analysis 3+0 7.5

Linear Algebraic Equations; Review of Basic Mechanical Knowledge; Shape Functions: Shape functions in global coordinate systems, Shape functions in local coordinate systems; Equation of Motion and Virtual Work; Linear Spring element; Two Node Axial Elements: Assembling of element matrices, Transformation matrix, Boundary conditions and reaction forces; Torsion element: Boundary conditions and reaction forces; Bending and Frame Element: Two node element, Assembling of element matrices, Boundary conditions and reaction forces, Frame element; Two dimensional elements.

RYL546 Detection Methods of Railway Infrastructure Deformations, Maintenance and Renewal Methods 3+0 7.5

Railway Infrastructure; Functions of Ballast; Clean and Fouled (Spent) Ballast; Condition Monitoring Methods of Railway Infrastructure; Ground Penetrating Radar (GPR): History of GPR, Basics and fundamental working principles of GPR; Applications of GPR, Relative dielectric permittivity constant; Ballast Assessment with GPR: Distinguishing between clean and fouled ballast and maintenance/repair thresholds, Analysis of a case study from a sample railway infrastructure investigated by GPR, Determination of railway segments to be maintained, repaired and/or renewed as a result of analysis findings.

RYL548 Business Management in Railway Systems 3+0 7.5

Rail Systems and Types, Emergence of Railways, Development in Turkey and the World; Definitions and Terms Used in Railways; Definition and Characteristics of Train, Classification of Trains, Definition and Types of Stations, Numbering of Stations, Numbering of Shears, Numbering of Trains, Order of Trains; Domestic Goods Transportation Provisions; Introduction and Issue of Transport Document; Calculation of Transportation and Other Fees, Applications; (COTIF) Uniform Rules for the International Carriage of Goods (CIM-Annex B of the Convention); Some International Railway Organizations and Conventions.

RYL550 Integrated Logistics Management 3+0 7.5

Retail Logistics: Concept, Operation and Characteristics; Food Logistics: Concept, Operation and Characteristics; Textile and Apparel Logistics: Concept, Operation and Properties; Electronic Product Logistics: Concept, Operation and Characteristics; Automotive Logistics: Concept, Operation and Characteristics; Project and Construction Logistics: Concept, Operation and Characteristics; Tourism Logistics: Concept, Operation and Characteristics; Fair and Event Logistics; Pharmaceutical and Hospital Logistics; Waste and Recycling Logistics; Living Animal Logistics; Assistance and Disaster Logistics, Information Logistics, Military Logistics.

RYL551 Railway Electrification 3+0 7.5

Traction power supply systems in railways; Traction contact line systems and overhead contact line designs; Features of OLE systems; Auxiliary Components in OLE Structures; Electrical and Mechanical Principles of OLE Systems; The interaction of pantographs and overhead contact lines; Electrification in Light Rail (Tram and Trolley) Systems; Third Rail Systems; Interference issues with Signaling systems; Current return circuit and earthing; Contact line designs for special applications; Maintenances and Renewals, Standards and Regulations.

RYL552 Elastic Stability Analysis of Shells and Plates 3+0 7.5

Assumptions and Concepts in Thin-Walled Shell Theory; Calculation Methods in Elastic Mechanics; Shell Types; Boundary Conditions on Shells; Load Conditions and Applications on Shells; Variation Method; Surface Geometry and General Shell Equations; Rotational Shells: General rotational shells, Equilibrium method, Variation method, Numerical solutions of rotational shells; Plates: Plate equations, Plate analysis by finite difference technique.

RYL553 Deep Learning and Artificial Neural Networks 3+0 4.0

Introduction; History; The importance and application areas of deep learning; Structure of artificial neural networks; CNN and convolutional layer definition and structure; Layers and architecture of artificial neural networks; Current and successful architectures; Smote and data augmentation techniques; Image preprocessing in deep learning; Unbalanced classification and its prevention methods; Designing and implementing a deep learning architecture; Deep learning application with public data sets; Success metrics and calculation methods; The importance of the class activation map and calculation methods.

RYL554 Energy Efficiency in Railway Systems 3+0 7.5

Traction Power Supply Systems: Transformer Centers, Current Collecting Systems, Traction Motor and Drives; Vehicle Design: Control Group, Engine, Signaling and Communication Technologies, Comfort Functions; Energy Storage in Rail Systems: Energy Storage Devices, Batteries, Flywheels, Ultracapacitors, Hybrid Electrical Storage Systems, Energy Storage Types in Railway Systems, Onboard Energy Storage, Roadside Energy Storage, Comparisons of Onboard Energy Storage and Roadside Energy Storage Systems; Infrastructure and Plant Design: Fixed Plant Consumption; Efficient Use of Existing Facilities: Operation, Energy Efficient Driving Methods, Comfort Functions.

RYL555 Decision Making Techniques 3+0 7.5

Introduction to Decision Making; Decision Making Under Uncertainty: Payoff matrix, Maximax, Maximin, Criterion of Realism, Equally likelihood, Minimax; Decision Making under Risk: Probability, Expected value, Utility theory; Graphical Approaches for Decision Problems: Effect Diagrams, Decision Trees, Bayesian Networks; Modelling of Decision Problems; Multi-Criteria Decision Making; Simple methods - Value-based methods; Multi-Attribute Decision Making; AHP; TOPSIS; Outranking Methods: Promethee Electre; Group Decision Making.

RYL556 Cost Analysis in Railway Systems 3+0 7.5

Basic Concepts of Cost Accounting and Management; Cost Taxonomy; Cost Allocations; Process Costing; Cost–Volume–Profit Analysis; Job Costing Systems; Determining How Costs Behave; Traditional Cost Analysis Methods in Railway Systems; Standard Costing: A functional-based control approach; Activity-Based Costing; Time Driven Activity-Based Costing; Life Cycle Cost Modeling in Railway Systems; The Transaction Cost Economics in Railway Systems; Pricing and Profitability Analysis.

RYL557 Selected Topics in Railway Design 3+0 7.5

Wheel-Rail interaction: Interface, Guiding, Klingel Theory; Curves: General considerations, Curvature and superelevation, Transition curves; Track Loads: General considerations, Vertical forces, Lateral forces, Longitudinal forces, Influence of load and speed increase; Static design: Winkler model, Discrete and continuous models, Rail, sleeper and ballast stresses; Dynamic design: Basic principles, Track modelling; Track stabilization: Rail buckling, Lateral stability, Vertical stability; Ballasted track: Ballast bedding, Fundamental components, Improvements in ballasted tracks, Tramway tracks; Slab-track design; Rails: Modern rails, rail joints; Switches; Track maintenance and repair.

RYL558 High Speed Railways 3+0 7.5

YHD tanım ve ilkeleri; Trans Avrupa Demiryolu Ağı: Demiryollarında Yolcu ve Yük Taşımacılığı; Dünya ve Türkiye gelecek YHD hattı yatırım stratejileri, planlanan yatırımlar; YHD hatlarında kullanılan malzemeler; YHD hatlarında kullanılan emniyet sistemleri ve ekipmanları: Sinyal ve Tren kontrol sistemleri; YHD hattı projelerinin ekonomik değerlendirmesi; YHD raylı sistem araçlarında enerji verimliliği; YHD hatlarında karşılıklı işletilebilirlik (TSIs), sertifikasyon ve uygunluk değerlendirme süreçleri; YHD hattı ölçüm teknolojileri ve test ekipmanları; YHD Mühendisliğindeki gelişmeler; YHD ile ilgili güncel yayınların incelenmesi; Raylı Sistemlerde sürdürülebilirlik.

RYL592 Seminar 3+0 7.5

RYL701 Research in Area of Specialization 3+0 4.5

RYL702 Research in Area of Specialization 3+0 4.5

RYL790 Thesis 0+1 30.0

SHA511 Aircraft Performance And Operation Analysis I 3+0 7.5

Fundamental Definitions-Standard Atmosphere; General Performance Conditions-The Forces Effecting Aircraft and Axis Sets; General Flight Motions and Equations; Symmetric, Permanent; Rectiling Flight Motion-Flight Performance Characteristics Horigantal; The Cruising Flight Performance Characteristics; The Climbing Motion and Climbing Performance Characteristics; Descending Motion and Descending Performance Characteristics; Take-Off Motion-Take Off Length and Take Off Performance Characteristics; Landing Motion-Landing Length and Landing Performance Characteristics; Curved Path Flight Motion; The Bend Motion and Bend Performance Characteristics; Studies on the Curved Climbing and Descending Motions-Helisel and Spiral Climbing; Descending and Vrille; The Travel Length; The Travel Time.

SHA513 Oil Analysis Program in Aircraft Maintenance 3+0 7.5

Introduction: Lubrication, Features of Lubrication Oil; Oil Contamination; Different Test Methods; Spectrometric Oil Analysis Program (SOAP); Spectrometric Oil Analysis Techniques; Detectable Failures By SOAP; Important Subject Related to Sample Analysis at Oil Analysis Laboratories; Ferro graph; Ferro graphic Analysis; The Use of SOAP Together With Ferro graph; Importance of Determining the Wear With Oil Analysis; Efficiency of Different Analysis Techniques in Determining the Wear.

SHA515 The Effects of Construction Techniques Aircraft on Performances of Light 3+0 7.5

Introduction; Construction of Light Aircraft; Wing structure; Fuselage Structure; Power plant; Empennage; Landing Gear; Equipment; Typical Construction Materials Used in The Light Aircraft; Wood; Metals; Composite Materials; Basic Performances and Factors Affecting Basic Performances; Basic Performances; Effect of Changing Wing Structure; Effect of Changing Weight; Effect of Changing Engine Power; Examination of the Construction and Performance Features.

SHA524 Modern Control Systems 3+0 7.5

State Variable Analysis of Control Systems: State Variables; State Concept; State Equations; Transfer Matrix; Solution of Time Invariant State Equations; Linear Time Varying Systems; Discrete Time Systems; Controllability and Observability; Controllability and Observability of Linear Dynamic Equations; Output Controllability; Obtaining State Equations in Canonical Forms; Design of Control Systems in State Space; Pole Placement; Observer Design; Optimal Control Problems; Performance Index; Selection of Performance Index.

SHA525 CNS-ATM Systems 3+0 7.5

CNS-ATM Concept: CNS-ATM concepts and stages of development, Global and regional plannings, Communication Systems; Present and future communication systems, Data link communications, Aeronautical Telecommunication Network (ATN), Navigation Systems; Present and future navigation systems, Performance Based Navigation (PBN), Required Navigation Performance (RNP), Surveillance Systems; Present and future surveillance systems, Automatic Dependent Surveillance (ADS), Air Traffic Management (ATM); Air Traffic Services (ATS), Air Traffic Flow Management (ATFM), Airspace Management (ASM), Human factors and ATM Automation, CNS-ATM Applications; FANS 1/A applications, Studies on capacity increasing, ADS and CPDLC applications.

SHA531 Industrial Aerodynamics 3+0 7.5

Wind Energy Resources; History of Wind Energy Appliances; Types of Wind Turbines: Horizontal Axis Wind Turbines, Vertical Axis Wind Turbines, Aerodynamics of Horizontal-Axis Wind Turbines: Betz Limit, Rotor Disk Theory, Angular Momentum Theory, Maximum Power, Rotor Blade Theory, Blade Geometry; Wind Potential Determination;Wind-Turbine Performance and Availability; New Developments and Trends on Wind Turbine Energy.

SHA535 Helicopter Theory and Flight Principles 3+0 7.5

Types of Aircraft; Basic Laws of Mechanics and Aerodynamics; Blade and Rotor; Lift and Drag of a Rotor Blade; Center of Pressure of a Rotor Blade; Forces Acting on a Rotating Blade; Total Rotor Lift (Thrust); Dissymmetry of Lift; Flapping Motion; Lift Control; Collective Pitch; Cyclic Pitch; Tail Rotor; Aerodynamic Behavior of a Rotor Blade; Vortex; Ground Effect; Autorotation; Limits of Rotation Speed; Helicopter Flight Principles; Hover; Forward Flight; Required Power; Flight Ceiling.

SHA536 Flight Control System Design 3+0 7.5

Flight Control; Control Surfaces; Flight Control Systems; The Equations of Motion of an Aircraft; Axis Systems; Linearized Equations of Motion; State and Output Equations; Transfer Function; Aircraft Stability and Dynamics; Longitudinal Stability; Static and Dynamic Stability; Transfer Functions Related to Longitudinal Motion; Short Period and Phugoid Approximation; Lateral Stability; Transfer Functions Related to Lateral Motion; Control System Design; Generalized AFCS; Parameter Optimization; Stability Augmentation Systems; Actuator and Sensor Dynamics; Longitudinal and Lateral Control.

SHA537 Exergy Analysis 3+0 7.5

1st Law of Thermodynamic: Closed systems; Control Volumes; Energy Balance; 2nd Law of Thermodynamic: Heat machine; Reversible and Irreversible States; 2nd Law Analysis For Control Volumes; Entropy: Entropy Change of Pure Substances; Entropy Change of Ideal Gas; Isentropic Efficiency; Entropy Balance; Exergy: Change of Exergy; Exergy Transfer; Exergy Balance; Chemical Reactions: Stoichiometric Combustion; Thermochemistry; Second Law; Exergy and Irreversibility; Work Production From Chemical Reactions; Chemical Exergy of Fuels; Energy Analysis; Exergy Analysis.

SHA538 Flight Procedures And Airspace Design 3+0 7.5

Conventional Procedures; Area Navigation (RNAV) procedures; RNAV/ Barometric Vertical Navigation; Departure and Approach Procedures for Required Navigation Performance (RNP) Approved Systems; RNP Holding Procedures; Airspace:

Criteria for Airspace Sectorisation, Sector Capacity; Terminal Airspace Design: Terminal Airspace Configuration, The Function of Terminal Airsapace, Sectorisation of Approach Control and Terminal Airspace, Traffic Flow, The Establishment of SIDs and STARs, Methodology for Terminal Airspace design.

SHA539 Advanced Aerodynamics 3+0 7.5

Basic Relations: Continuity, Momentum and Bernoulli Equations; Potential Flow Theory: Ideal incompressible flow, Stream function, Basic types of flow; 2-D incompressible flow around cylinder: Circulation and lift, General thin airfoil theory, Symmetrical and cambered profiles; Incompressible Flow around Slender Wings: Vortex system, Effect of swept wing, Delta wings, Wing and fuselage configurations; Compressible Flow: Basic definitions, Energy equation, Adiabatic and isentropic flows, Shock waves; Transonic flow: 2-D transonic flow, Transonic flow around wings; Supersonic flow; Unsteady Aerodynamics.

SHA541 Current Issues in Gas Turbine Engines 3+0 7.5

Basic Notions: Classification and structure of gas turbine engines, General definitions; Exergy Analysis: Calculations, Application for gas turbine engines; Methods For Improving Efficiency Of Gas Urbine Engines; Methods For Improving Thrust Of Gas Urbine Engines; Vibration: Basic notions, Devices and cursors used for analysis; Noise; Corrosion; Emission Analysis For Gas Turbine Engines; Gas Turbine Engines Of Unmanned Aerial Vehicles; Auxiliary Power Units (APUs).

SHA543 Parametric Cycle Analysis of Aircraft Propulsion System 3+0 7.5

Introduction; Propulsion; Air-Breathing Engines; Thermodynamics Review; Compressible Flow; Classification of Aircraft Gas Turbines; Factors Effecting Thrust; Thrust Force; Engine Performance Parameters; Steps of Engine Parametric Cycle Analysis; Ideal Turbojet; Ideal Turbojet with Afterburner; Ideal Turbofan; Ideal Mixed Turbofan with Afterburner; Ideal Turboprop engine; Ideal Turboshaft Engine; Component Performance; Variation in Gas Properties; Inlet and Diffuser Pressure Recovery; Compressor and Turbine Efficiencies; Burner Efficiency; Exit Nozzle Loss; Component Figures of Merit; Parametric Cycle Analyses of Real Engines; Real Turbojet; Real Turbojet with Afterburner; Real Turbofan with Separate Exhaust Stream; Real Turbofan with Afterburning-Mixed Exhaust Stream; Computer Programing for Cycle Analysis.

SHA545 Fuzzy Logic Applications in Aviation 3+0 7.5

Introduction to Fuzzy Logic; History of Fuzzy Logic; Overview of Fuzzy Logic; Fuzzy Sets; Classical Control Systems; Fuzzy Systems; Fuzzification and Membership Functions; Rule-Base; Data Base; Defuzziciation; Middle of Maximum Method; Centroid Method; Fuzzy Control; Examples of Fuzzy Control; Applications of Fuzzy Logic; Application of Air-Condition; Application of the Inverted Pendulum; Control of Final Approach of the Aircraft; Application of the Flight Controls; Application of The Longitudinal Control of the Aircraft; Application of the Longitudinal Controller; Application of the Flap.

SHA547 Flight Tests and Instrumentation 3+0 7.5

Fundamentals; Phases of Flight Tests; Flight Performance Tests: Pitot static system performance; Stall speed determination; Level flight performance; Excess power characteristics; Turn performance and agility; Climb performance; Descent performance; Take-off and landing performance; Standard mission profiles; Design of Instrumentation: Factors influencing instrumentation system design; Basic elements of instrumentation; Flight Tests Applications.

SHA548 Experimental Aerodynamics Analysis for Incompressible Flow 3+0 7.5

Introduction; Fundamental of Aerodynamics; Aerodynamics Forces and Moments; Dimensional Analysis; Flow Similarity; Types of Flow; Applied Aerodynamics; Models of Fluid: Control Volume and Fluid Elements; Continuity Equation; Momentum Equation; Energy Equation; Incompressible and Compressible Flows; Fundamentals of Incompressible Flow; Bernoulli's Equation; Incompressible in Duct: The Venturi and Low-Speed Wind Tunnel; Pitot-tube: Measurement of Airspeed; Measurement Equipment for Aerodynamics Experiments and Experimental Error; Flow Over a Circular Cylinder; Flow over Airfoils; Incompressible Flow over Finite Wings; Pressure Distribution and its Evaluation on the Aerodynamics Shapes; Boundary Layer Measurement; Velocity and Pressure Measurement over Finite Wings; Aerodynamic Analysis of Some Industrial Shapes

SHA549 Gas Turbine Combustion 3+0 7.5

Introduction; Combustion and Thermochemistry; First Law of Thermodynamics; Ideal Gas Mixture; Adiabatic Flame Temperature; Second Law of Thermodynamics; Chemical Equilibrium; Introduction to Mass Transfer; Chemical Kinetics; Simplified Conservation Equations For Reacting Flows; Introduction to Turbulent Flows; Premixed Turbulent Flames; Turbulent Nonpremixed Flames; Fundamentals of Aircraft Gas Turbine Combustor Design; Combustors for Low Emissions; Heat Transfer Mechanism for Combustors.

SHA550 Preliminary Design of Unmanned Air Vehicle and Its Propulsion System 3+0 7.5

Introduction; Unmanned Air Vehicles; Engine Types Used in Aeronautics; General Utilization Limits of Engines; Engine Selection by Mission Profile; Basic Parameters of Engine Design: Flight and aircraft system parameters, Design constraints,

Design choices; Parametric Cycle Analysis of Engines: Component behaviour and efficiencies, General engine performance output parameters; Unmanned Air Vehicle Sizing; Performance Calculations for Unmanned Air Vehicle.

SHA551 Airline Operations and Scheduling 3+0 7.5

Planning Optimization: Networks, Network flow models, Shortest path problem, Minimum cost flow problem, Maximum flow problem, Multi-commodity problem, Integer programming models, Set covering/partitioning problems; Flight Scheduling: Hub-and-spoke, Route development and flight-scheduling process, Load factor and frequency; Fleet Assignment: Indicator definitions, Mathematical model; Aircraft Routing: Maintenance requirements, Mathematical model; Crew Scheduling: Crew pairing, Crew pairing mathematical model, Crew rostering, Crew rostering mathematical model.

SHA552 Experimental Methods and Data Processing Techniques for Turbomachinery 3+0 7.5

Introduction; Description of Measurement Chain and Its Components; Terminology Associated with Measurement Techniques; Pressure Measurement Techniques; Temperature Measurement Techniques; Velocity Measurement Techniques; Measurement of the Flow Angle; Optical Measurement Techniques; Classification of the turbine test rigs, Flow field measurements; Performance Measurement of Basic Engine Components; Fundamentals of Statistics; Frequency Analysis; Data Processing of Periodic Signals; Uncertainty analysis.

SHA553 Air-conditioning Systems for Aircraft 3+0 7.5

Introduction; Air-contioning and Ventilation; External and Environment Conditions; Effects of Cabin Internal Conditions on Staff, Device and Hardware; Thermodynamics Conditions, Temperature, Humiditiy, Pressure; Indoor Air Quality, Comfort Parameters, Psychometry; Heat Loads in Aircrafts, Heat Stress Indices, Thermal Comfort for Heat Balance; Thermal Loads on Aircraft Cabins; Heat Balance in Flight Cabin, Air Distribution and Velocity, Fog and Permeability; Air-conditioning Systems in Aircrafts; Air Flow Open Systems and Closed Systems; Vapor-compression Refrigeration Systems; Environmental Control Systems in Aircrafts.

SHA554 Aviation Lighting Technics 3+0 7.5

Fundamentals of Photometric and Radiometric Quantities; Interior and Exterior Lighting; Lighting Calculations; Importance of Lighting in Aviation: Visual performance, Energy and cost effectiveness; Lighting Parameters: Lighting level, Uniformity, Luminance distribution, Glare, Colour temperature, Colour rendering; Lamps; Luminaires; Lighting Used in and on Aircraft; Airport Lighting: Public areas, Runways, Taxiways; Inspection and Maintenance of Lighting in Aircraft; Visual Illusion.

SHA555 Airport Information and Communications Technology Service Management 3+0 7.5

What is Information Technology Infrastructure Library: Service design, Service transition, Service operation; Airport Information Technology Infrastructure: Network systems, System rooms, Telecommunications, Database systems, Integrations, Message flow; Computer Applications of Airports: Flight info systems, Operational database, Resoruce management, Common use systems, Revenue management; Helpdesk Design: Service Level Agreements, Support system suggestions.

SHA556 Mathematical Programming in Air Transportation 3+0 7.5

Linear Programming: Basis concepts, Geometric solution; Linear Algebra: Convex analysis, Polyhedral sets; The Simplex Method: Extreme points and optimality; Mathematical Modeling: Coding of the linear programming problems in Gams/Lindo and analysis of the computer solutions and interpreting computer solution, Sensitivity analysis; The Integer Programming Models; Aviation Application: The man-power planning in the airport, Airway fuel management models, Airway off-plan operations management, Determination of airport runway capacity, Airport aircraft door assignment model, Integrated airline planning models.

SHA557 Multidisciplinary Research Topics in Aviation 3+0 7.5

Scientific Research Methods; Indexes and Search Engines; Journals and Classifications; Peer Review and Editorship; Mini and Micro UAV Technologies; Bio-Inspired Drone Design; Sustainability Indicators for Aviation; Green Airpots and Technologies; Electrical-Hybrid Aircrafts and Fuel Cells; Battery Management Systems; Management Strategies and Environmental Sustainability; Resource Management in Aviation; Innovations for Airline Operations; Advanced Maintenance Technologies and Management.

SHA558 Current Issues in Sustainable Aviation 3+0 7.5

Engine Performance and Alternative Fuel Usage: Alternative fuels used in aviation, Engine performance analysis; Electric Airplanes and Battery Systems: All electric aircraft and more electric concept, Battery management systems; Sustainable UAV: Use of alternative energy in UAVs, Hybrid systems, UAV with fuel cells, UAV with solar batteries, Bio-inspired UAV; PIV applications in aviation; Alternative Fuel Usage in Aircraft Engines.

SHA559 Human Factors in Aviation Operations 3+0 7.5

Introduction to Human Resources in Aviation and Basic Concepts; Cockpit- Team Resources Management; Human Factors; Planning of Human Resources; Recruitment and Selection and Methods; Job Orientation and Harmonization; Training and Development; Performance-Competency Assessment; Compensation; Motivation and Job Satisfaction; Occupational Health and Safety; Labor Relations; National and İnternational Human Resources Applications in Aviation Sector; The Projects and Research of Human Resources in Aviation.

SHA560 Aerospace Materials 3+0 7.5

Generally Aviation Materials and Classification; Metals as Aerospace Materials; Ceramics as Aerospace Material; Composites As Aerospace Materials; Plastics as Aerospace Materials; Radar Absorption Materials; Vehicle Armor/Personal Ballistic Protection Products; Pyrotechnic and Pyrotechnic Materials; Aircraft and Helicopter Fuselage; Aircraft and Helicopter Fuselage Materials and Applications.

SHA562 Airline Management 3+0 7.5

Airline transportation; Global Airline Alliances; Air Transportation Market Structure; Concept of Pricing and Revenue Management; Customer Concept; Traditional Carriers; Low Cost Carriers; Charter Carriers; Regional Carriers; Cargo Carriers; Air Transportation and Tourism; Innovation in Air Transport.

SHA564 Mechanical Properties of Materials 3+0 7.5

Stress and Strain; Yielding Criteria, Crystal structures and defects; Dislocations: Movements and interactions with other obstacles; Mechanisms of Plastic Deformation; Strengthening Mechanisms: Solid solution, Strain hardening, Diffusionless transformation, Aging; Applications of Linear Elastic Fracture Mechanics; Fatigue of Materials: Crack initiation and propagation, Factors affecting fatigue strength; Creep: Mechanisms of creep and stress rupture.

SHA566 Human Factors in Aviation Operations 3+0 7.5

The Definition of Human Factors and Related Concepts; Safety Culture; Critical Human Factors in Aviation Safety; Discussion of Human Performance and Aviation Safety-Capacity; Human Information Processing and New Trends; Factors Affecting Situational Awareness; The Applications about The Measurements of Aviation Operators: Stress, Workload, Fatigue; Interaction of Human Factors and Aviation Automation; Communication; Motivation; Neuro-Science Applications and Human Factors in Aviation; Scenario and Problem Based Practices; Human Factors in Nextgen and SESAR Projects.

SHA568 Business Analytics and Data Analysis 3+0 7.5

Introduction to Business Analytics; Analytics on Spreadsheets; Descriptive Analytics: Descriptive statistical measures; Probability Distributions and Data Modeling: Sampling and estimation, Statistical inference, Trendliness and regression analysis, Forecasting techniques; Introduction to Data Mining; Spreadsheet Modeling and Analysis; Monte Carlo Simulation and Risk Analysis; Decision Analysis.

SHA572 Safety Management in Aviation Operations 3+0 7.5

Concepts Related to Safety Management in Aviation: Safety, Security, Capacity, Risk, Hazard, Danger, Threat; Safety Culture And it's Pillars; Safety Management Systems and Pillars: Safety Policy, Safety Risk Management, Reactive, Proactive and predictive safety management tools and methods, Collection and assessment of risk related data, Safety performance and it's assurance, Safety promotion activities: Risk and reporting culture, Measurement of safety culture; Error Evaluation and Management; Change Management; Emergency Action Planning And Management; Problem And Scenario Based Practices; SESAR and NextGen Projects.

SHA576 Simulation for Airline and Airport Operations 3+0 7.5

Introduction to Simulation; Basics of Queueing Theory; Types of Simulation; Simulation Packages; Simulation Models; Modeling with Simio or Arena;Input Analysis with Simio or Arena; Working with Model Data; System Animation and Entity Movement; Simulation Projects on Airport and Airline Operations.

SHA592 Seminar 3+0 7.5

SHA601 Airline Management 3+0 7.5

Fundamental Definitions and Rules; Classification and Organization Properties of Airlines Managements; Planning Activities; Techniques of Flight Programming; Administration Activities; Coordination and Communication; Administration Units; Affects of Administration Properties; Education Types and Properties; Aircraft Selection; Constitution of Fleet; Technical; Economical and Political Interaction; Rantability Areas of Aircraft; Flight Planning; Selection of Flight Path; Forming New Path-Flight Profiles; Technical and Economical Operations Characteristics of Aircraft; Transportation and Personnel Price Policies; Revenues; Private Service air Transportation; Air-Taxi and Charter Companies; Airlines Transportation and Operations Rules; Authorities.

SHA602 Aircraft Dynamics 3+0 7.5

Fundamental Definitions; Aircraft Handling Qualities; Control Surfaces and their Characteristics; General Equilibrium and Stability Definitions; Conditions and Features; Longitudinal Static Equilibrium and Stability Definitions and Features; Symmetrical Maneuver Analysis; General Equations of Motion of Aircraft; Analysis of Symmetrical Movements With Dimensionless Quantities; Longitudinal Static Stability Analysis; Longitudinal Dynamic Stability Analysis Stick-Fixed Stability Analysis; Stick-Free Stability Analysis; Study of Longitudinal Behavior and Unsymmetrical Movements; Study of Lateral Equilibrium and Stability; Analysis of Equilibrium and Stability of Special Flight Movements.

SHA604 Engineering Economic Analysis 3+0 7.5

Cost Concepts; Time Value of Money Operations; Interest Calculations; Single Sums of Money; Series of Cash Flows; Multiple Compounding Periods in Year; Continuous Compounding; Equivalence; Variable Interest Rates; Consideration of Inflation; Principle Amount in Loan Payment; Measuring the Worth of Investments; Methods of Measuring Investment Worth; Capital Recovery Formula; Comparison of Alternatives; Defining Investment Alternatives; Defining the Planning Horizon

SHA608 Optimization Methods in Flight Mechanics 3+0 7.5

Maximum and Minimum Theory, Maximums and Minimums of Multi Variable Functions, Lagrange Multipliers; Optimization; Optimization Conditions of Performances in Steady State Flight; Turns in Level Flight; Maximum Rate of Climb in a Constant Radius Helicoidal Climb; Maximum Bank Angle in a Helicoidal Climb; Minimum Radius of Turn in a Helicoidal Climb; Maximum Angular Velocity in a Helicoidal Climb; Calculation of Flight Altitude for Maximum Level Flight Speed; Maximum Range for a Given Flight Altitude; Optimization of Rate of Descent in a Helicoidal Descent; Minimum Flight Path Angle in a Helicoidal Descent.

SHA614 Airport Design 3+0 7.5

Airport Planning; Airport System Planning Airport Master Planning; Airport Site Selection; Airport Characteristics Related to Airport Design; Airport Capacity; Forecasting in Aviation and Airport Planning; Airport Configuration; Geometric Design of the Airfield; Passenger Terminal Design; Air Cargo Terminal Design; Heliports; STOL Ports and Vertiports; Airport Lighting and Marking; Structural Design of Airport Pavements.

SHA615 Advanced Mechanical Vibrations 3+0 7.5

Non-dispersive Behaviour of Uncoupled Vibrations; Pure Torsional Vibrations; Pure Shear Vibrations of Beams; Dispersive Behavior of Uncoupled Vibrations; Transverse Vibrations of Euler-Bernoulli Beams; Transverse Vibrations of Timoshenko Beams; Dispersive Behaviour of Uncoupled Vibrations, Approximate Solutions; Transverse Vibrations of Euler-Bernoulli Beams; Free Wave Propagation in Uniform, Infinite and Periodic Structures.

SHA617 Sliding Mode Control Theory 3+0 7.5

Switching Strategies for Linear Time-invariant (LTI) Systems; Driving LTI Systems Into the Sliding Mode and Making Them Track Desired Trajectory; Chattering and its Elimination; Relay Control; Robustness; Modeling Errors; Disturbances; Switching Hierarchy in MIMO Systems; Driving Nonlinear Systems Into the Sliding Mode and Making Them Track Desired Trajectory; Two-Link Robot Arm Example; MATLAB Implementation of Sliding Mode Control Techniques; Discrete Time Sliding Mode Control.

SHA618 Fault Tolerant Flight Control System Design 3+0 7.5

Introduction; Some Aircraft Accidents and Importance of Fault Tolerant Control; Fault Tolerant Control; Definitions and Concepts; Fault Detection; Fault Isolation; Reconfiguration; Methods Used in Fault Detection and Isolation; Full-Order Observers; Reduced-Order Observers; Unknown Input Observers; Fault Detection Using Observers; Fault Isolation Using Observers; Fault Detection Using Unknown Input Observers; Fault Isolation Using Unknown Input Observers; Kalman Filter; Flight Control System; Equations of Motion And Pitot Static System; Sensor and Actuator Fault Detection; Isolation and System Reconfiguratıon in Flight Control System; State Estimation; Fault Detection; Isolation and System Reconfiguratıon In Flight Control System Using Unknown input Observers; Practical Applications

SHA619 Cogeneration -Combined Heat Power Systems 3+0 7.5
Thermodynamic Principles of The Combined-Cycle Plant; Otto Cycle; Carnot Cycle; Diesel Cycle; Rankine Cycle; Brayton Cycle; Combined Cycle Concept; Single -Pressure Cycle; Preheating; Dual-Pressure Cycles; Triple-Pressure Cycle; Triple-Pressure Reheat Cycle; Application of Combined-Cycle; Combined Heat Power Systems's Components; Gas Turbine; Heat Recovery Steam Generator; Steam Turbine and Other Components; Comparison of Thermodynamic Performance of Combined Heat Power Systems; Economic Analysis of Cogeneration.

SHA620 Aircraft Performance and Operational Analysis II 3+0 7.5
Fundamental Definitions, Limit Airspeeds; Limit Loads; Structural Maximum Weights; Flight Maneuvering Envelope; Engine Limitations; Take-off Performance And Limitations, Factors Effecting Take-off Performance; Cruise Performance, Cruising Speed, Range And Endurance, Factors Effecting Cruise Performance; Landing Performance And Limitations, Factors Effecting Lading Performance; Weigh And Balance, Determination of The Center of Gravity; Mission Profile; Operational Analysis of The Mission Profile Phases; Flight Preparation; Fuel Calculations; Airworthiness Regulations.

SHA621 Advanced Gas Thermodynamics 3+0 7.5
Basic Concepts: Maxwell correlations, Clapayron equation, Internal energy, Entropy, Enthalpy, Equations of state, Joule Thomson coefficient; Changes of Thermodynamic State in Gases, Enthalpy Change in Real Gases, Entropy Changes in Real Gasses, Gas Behaviors, Formation Entropy in Gases; Combustion Analyses in Reactive Systems, First Law Analysis, Second Law Analysis; Phase and Chemical Balance in Combustion, Chemical Balance and Analyses in Gases, Phase Balance in Gases.

SHA625 Fatigue of Thermal Barrier Coating Systems 3+0 7.5
Introduction to Gas Turbine Engines: Principles of Operation; Compressor; Combustion Chamber; Turbine; Thermal Efficiency; Introduction to Thermal Barrier Coating Systems: Substrate; Bond Coat; Thermally Grown Oxide; Top Coat; Materials Used in Thermal Barrier Coating Systems; Coating Techniques: Thermal spray; PVD; CVD; Gas Turbine Engine Applications; Microstructure of Thermal Barrier Coating Systems; Testing of Thermal Barrier Coating Systems: Isothermal ageing tests; Thermal Fatigue Tests; Thermal Mechanical Fatigue Tests; Isothermal Low Cycle Fatigue Tests; Hardness Tests; Creep Tests; Thermal Conductivity Tests.

SHA626 Genetic Algorithms and Applications of Control Systems 3+0 7.5
Introduction to Genetic Algorithm; Traditional Optimization Techniques; The Goals of Optimization; Genetic Algorithms as a Optimization Process; How are Genetic Algorithms Different From Traditional Methods; A Simple Genetic Algorithm; Theoretical Basis of Genetic Algorithms; Basic Theorems; Computer Coding of Genetic Algorithms; Reproduction; Crossover; Mutation; Some Applications of Genetic Algorithms; Application Areas of Genetic Algorithms in Control Systems.

SHA627 Sizing of Propeller-Driven and Jet-Powered Aircraft 3+0 7.5
Performance Objectives; Sizing Procedure; Speed Prediction; Airport Performance; Stall Speed; Landing/Take-Off Performance; Climb Performance; Cruising Performance; Aircraft Lift-Drag Characteristics; Engine Characteristics; Cruise Matching; Off-Design Cruise Operation; Aircraft Matching; Take-Off and Climb Calculation; Gross Weight Estimation; Weight Relationships; Useful Weight Fraction; Gross Weight Estimation; Range and Fuel Fraction; Aircraft Sizing.

SHA628 Airspace Management 3+0 7.5
The Concept of the Flexible Use of Airspace; Flexible air Space Management and Civil/Military Coordination; Airspace Management Levels; Flexible Airspace Structures And Procedures; Strategic Level; Conditional Routes; Temporary Segregated Areas; Pretactical Level: Airspace Management Cell Authority; Airspace Allocation Process; Harmonization of Airspace Management/Air Traffic Flow Management; Centralized Airspace Data Function; Tactical Level; Operational Requirements; Technical Support; Air Traffic Services Organization; Publication of Air Space Management Information; Airspace Use Plan; Updated Airspace use Plan; Conditional Route Availability Message.

SHA629 Non-Destructive Inspection Methods for Aircraft Maintenance 3+0 7.5
Advantages of Non-Destructive Inspection in Aircraft Maintenance; Capacity of Non-Destructive Inspection Methods for Structural Defects; Special Non-Destructive Inspection Methods; Non-Destructive Inspection of Aircraft Elements; Fuselage; Wings; Tail Group; Landing Gear; Power plants; Inspection of Circular Holes With or Without Fasteners; Inspection of Bolts and Rivets; Inspection of Corrosion and Fatigue Defects; Inspection of Thermal and Impact Defects; Inspection of Composite Structures.

SHA630 Current Issues in Gas Turbine Engine Combustion Systems 3+0 7.5
Basic Notions: Classification and structure of gas turbine engines, General definitions about fuel systems; Low NOx Combustion Systems; Knocking In Combustion Chambers; Catalytic Combustion Systems; Methods for Improving Efficiency In Combustion Chambers: Water injection, Vapour injection; Noise In Combustion Chambers And Methods For Preventing; Hydrogen Utilization In Aviation; Fuel-Cell Utilization In Aviation; Synthetic Gas Fuel (Syngas) Utilization In Aviation; Biofuel Utilization In Aviation.

SHA631 Aerothermodynamic Optimization of Aircraft Propulsion Systems 3+0 7.5

Classification of aircraft gas turbines; Turbojet engines; Turboprop; Turboshaftt engines; Propfan engines; Advance ducted engines; Factors effecting thrust; Introduction; Thrust force; Jet nozzle; Air speed; Air mass flow; Altitude; Ram Effect; Engine performance parameters; Propulsive efficiency; Thermal efficiency; Propeller efficiency; Overall efficiency; Take off thrust; Specific Fuel consumption; Aircraft range; Range factor; Specific thrust; Optimization of turbojet engine cycle; Thermodynamic analyse; Ideal cycle; Real cycle; Afterburner effect; Optimization analyses of turbojet cycle; Optimization of high bypass turbofan engine cycle; Thermodynamic analyse; Ideal cycle; Real cycle; Optimization of high bypass turbofan cycle; Optimization analyses of turbofan engine with afterburner cycle; Thermodynamic analyse; Ideal cycle; Real cycle; Optimization analyses of afterburner turbofan engine cycle; Optimization analyses of turboprop and turboshaft engine cycle; Thermodynamic analyse; Ideal cycle; Real cycle; Optimization analyses of turboprop and turboshaft engine cycles

SHA632 Free Flight Concept and Analysis 3+0 7.5

Definition and Concept Description; Environment; Scheduling; Routing; RTCA Workshop Report; Free Flight with Airborne Separation Assurance (ASAS); User Preferred Separation Assurance; User Preferred Local Traffic Flow Management Conformance; ASAS with Cockpit Display Traffic Information; Overview on Conflict Detection and Resolution Methods; State Estimation and Conflict Detection; Conflict Resolution Methods; Flight Rule Evolution and Optimization Process.

SHA633 Operational Risk Management in Aviation 3+0 7.5

Basic Concepts Related to Risk Management in Aviation Operations; The Culture of Safety-Risk-Reporting; Evaluation of Primary and Secondary Risks in Operations; Data Collection and Assessment for Risk Management; Risk Matrix and Analysis of Probability and Severity; Operational Risk Tools and Techniques; Bow-Tie Risk Analyze Tool; Elimination of Risks; ALARP Principle in Aviation; Problem and Scenario Based Practices for Operational Personnel.

SHA634 Project Management in Aviation 3+0 7.5

Introduction to Project Management in Aviation; Global Aviation Projects: NextGen and SESAR; Basic Project Management Concepts; Project Management Processes: Definition of project task, Estimation of project costs, Project organization, Development of work breakdown, Planning of project duration, Implementation of project plan; Supply Chain For Aviation Projects; Purchase Process; Change Management; Cost Management; Analyze of Earned Value and Cost Reporting; Dissemination of Project Actions and Outputs; Project Closure and Post-Project Actions; Project Case Development.

SHA635 Trending Topics in Unmanned Aerial Vehicle Technology 3+0 7.5

Introduction to Unmanned Aerial Vehicle Technology; Classification of UAVs; UAV Missions; Target UAVs; Lighter Than Air UAVs; Importance of Modularity in UAVs; Morphing UAV Structures; Amphibious UAVs; Solar Powered UAVs; Hydrogen Fuelled UAVs; Bio Inspired UAVs; Micro Rotary Wing UAVs; Micro Fixed Wing UAVs; Swarm Technologies in UAVs; Formation Flight of UAVs; Flying UAVs with Motion Control.

SHA636 New Approaches in Air Traffic Management 3+0 7.5

Air Traffic System; Concept of Air Traffic Management; Role of Air Traffic Management in Airline Transportation; Service Principles in Air Traffic Management; Efficiency and Quality in Air Traffic Management; Air Traffic Service Providers and General Features; Users in Air Traffic Management; Expected Developments in Airline Transportation; Analysis of Current Situation in Air Traffic Management; Problem Areas in Air Traffic.

SHA637 Performance Analysis of Aero Engines 3+0 7.5

Air Vehicle: Aircrafts, Helicopter/Chopper, Unpowered Airvehicle, Unmanned Aerial Vehicles; Aero Engines: History and Development, Engine Types, Engine Simple Drawing; Aviation Performance Metrics: Specific Fuel Consumption, Specific Impulse/Power/Thrust, Overall Pressure Ratio, Thermal Limiting, EGT limiting; Energetic Performance Metrics: Entalphy Limiting, Energy efficiency, Energy Losses Ratio; Exergetic Performance Metrics: Exergy Efficiency; Waste Exergy Ratio, Fuel Exergy Waste Ratio, Productivity Lack Ratio, Exergetic Improvement Potential, Environmental Effect Factor, Sustainability Index.

SHA638 Network, Fleet and Schedule Planning in Aviation 3+0 7.5

Introduction and Airline Industry Overview; Airline Current Business Environment: Airline passenger capacity and demand, air cargo capacity and demand; Flight Schedule; Airline Network Structures and Models: Network economy, Hubs airports, Hub and spoke network, Point-to-point services; Airline Network Strategies; Airline Markets and Fundamentals of Demand; Route Planning and Profit Evaluation; Modeling of Passenger Flight Options; Fleet Planning: Evaluation of alternative aircraft types, Fleet planning evaluation process, Aircraft selection criteria; Fleet Analysis: Passenger demand, Load and Spill Analysis; Airline Planning Process: Route evaluation, Fleet planning, Scenario analysis; Airline Operating Costs; Airline Operations Scheduling.

SHA640 Single Score Life Cycle Assessment (LCA) 3+0 7.5

LCA Model: Quantitative and qualitative analysis of environmental effects, Life cycle of the production, Operational outcomes; What is ReCiPe Model: Scoring emissions and resources, Characterization effects, Midpoint and endpoint indicators; Creating the Inventory: Process detail, Analysis of input and diversity, Assessing the analysis results; Single Score Assessment: Advantage of the single score, Multi-dimensional calculations by the single score, Case studies in Aviation, Calculations for airport.

SHA642 ICT Project Management for Airports 3+0 7.5

PMI Project Management Method: Initiation, Planning, Monitoring, Control, Close out; Scope of Airport IT Project: Scope of work, Grouping the sub systems, Definition of the specifications; Managing of: Budget, Integration, Risk, Quality, Tests; System Installations and Commissioning: Hierarchy in between systems, Integrations of the systems, System tests, ORAT - Operational Readiness and Transfer.

SHA692 Seminar 3+0 7.5

SHA790 Thesis 0+1 30.0

SHA890 Thesis 0+1 30.0

SHA890-0 Thesis (Thesis Proposal) 0+1 30.0

SHY508 Air Traffic Management 3+0 6.0

History of Air Traffic Control and International Authorities; Air Traffic Management Definitions and Components: CNS/ATM concept, Air traffic control services, Alerting services, Information services, Air traffic flow management, Airspace management; Elements of Air Traffic Control System: Airspace, Technique equipment, Staff, Aero plane; Operational Air Traffic Management: Air traffic management functions, Organization, Planning-control, Co-ordination; Capacity and Efficiency: Recent problems and solution techniques in air traffic management, Simulation models and SIMMOD; Free Flight Concept; EATCHIP Programme.

SHY516 Aviation Marketing Management 3+0 7.5

Marketing Fundamentals; Evolution of Marketing; Functions of Marketing; Marketing Information Systems and Marketing Research; Airline Transportation and Market Structure; Market Segmentation and Selection of Target Market; Customer Behavior in Industrial Markets; Airline Marketing Strategy; Product Analysis for Airlines; Problems in Pricing; Distribution of Product and Selling The Airline Product; Policies of Advertising and Promotion Product; Airport Marketing.

SHY517 Aviation Safety Management 3+0 7.5

Safety Fundamentals; Factors Affecting Aviation Safety; Human Factors: SHEL model, Factors affecting human performance; Error Management Models: Reason model, Threat and error management model; Resource Management Programs: Communication, Leadership, Team work, Stress management, Conflict management, Situational awareness; Improving Safety Culture of Aviation Organizations; Safety Management System; Accident and Incident Investigation; Case Studies.

SHY527 Air Transportation Economics 3+0 7.5

The Concept of Air Transportation Economics; Structure of Air Transportation Industry; Economic Regulations in International Air Transportation Industry; Supply; Demand and Balance in Transportation Service; Market Structure and Competition; Airline Costs; Traffic Forecast and Capacity Management; Network Management: Network design; Scheduling; Fleet management; Tariff Structure and Pricing; Revenue Management; Airline Operations Performance; Case Studies: Network carriers; Low cost carriers; Other models.

SHY529 Cost Management in Aviation Companies 3+0 7.5

Introduction to Cost and Management Accounting; Cost Concepts: Definition of cost; Variable; fixed; and mixed costs; Cost Behavior and Cost Allocation; Activity Based Costing; Cost Volume Profit Relationship; Profit Planning and Budgeting; Overview to Cost Management Systems in Services; Cost Elements of Airlines and Airports; Cost Control Techniques; Cost Analysis and Assessment in Aviation Industry; Relevant Costs and Decision Making; Management Control Systems and Performance Measurement; Case Studies.

SHY531 Crisis and Risk Management in Aviation 3+0 7.5

Concepts of Crisis and Risk Management; Understand the Linkage Between Crisis, Risk Management and Organization; Effect of Ethics; Corporate Governance; Internal Control and Regulation; Risk Management Policy and Framework Development; Risk Management Principles and Methods; Identify Risks; Risk Situation is Influenced by Human-behavior and Culture within the Firm; Develop the Competencies and Capabilities to Both Manage Risk and Crisis; Crisis Management; Develop and Implement Organization-based Framework Models for Aviation Organizations; Best Practice of the Process are Investigations.

SHY534 Service Marketing in Airline Industry 3+0 7.5

The importance of the concept of service and the service sector; Airline industry and services; Classification of services; Airline marketing mix and elements of product; Distribution and price; Promotion and advertising; Sales promotion; Public relations; Personal selling and direct marketing; Personnel; Airline service and the customer; Physical evidence; Capacity and demand management; Service quality; Service encounters and real life experiences; Relationship marketing.

SHY536 Aviation and The Environment 3+0 7.5

The State of Aviation Industry; ICAO, EASA, ACI, SHGM latest trends, developments and challenges on environment; Regulatory Framework; Overview of regulatory issues; International and national bodies involved in the development of aviation environmental policy; Operational Measures; Managing the growing demand and increasing adverse traffic impacts; Economic Measures; The role of external costs and economic measures on environmental policy; Technological Measures; Technological advancements and approach to environmental issues; Social, Economic and Environmental Impact; Social and economic contributions of aviation related activities and main environmental impacts of each actor in this industry; Environmental Management System; Guidelines for developing airline and airport environmental management systems; Sustainable Aviation; Contributions of Aviation to sustainable development; Environmental vision for the near and far future; Case studies among aviation stakeholders.

SHY538 Case Studies in Aviation Management 3+0 7.5

Airline Business Models; Traditional Carriers, Low Cost Carriers, Regional Carriers, Unscheduled Carriers; Airline Competition and Competitive Strategies; Boeing and Airbus Competition; Relationship between Airports and Airlines; Airline Markets in Selected Countriers; Current İssues in Airline Management; Airline Alliances; Successful Cases in Airline Industry.

SHY540 Air Transportation Management 3+0 7.5

Concept of Air Transportation; History of Air Transportation Industry; Cost and Production Analyses; Airline Infrastructure; International Economy and Aviation; Open Skies and Global Alliances; Structure of Air Transportation Market; Pricing and Revenue Management; Low Cost Carriers; Charter Airlines; Regional Airlines; Air Cargo Airlines.

SHY541 Marketing Management in Airlines 3+0 7.5

The Marketing Concept; Airline Industry-Marketing Environment; Airline Marketing and Features; Customer Marketing Strategies; Product in Airline Market Pricing and Yield Management; Distributing the Product; Airline Advertising and Promotional Policies; Brand Management in Airline Marketing; Evaluation of the Air Transportation Market.

SHY542 Financing Applications in Air Transportation 3+0 7.5

Financial Management Within Today's Air Transportation Industry; Accounting in Air Transportation; Finance Organization in Air Transportation; Financial Ratio Analysis in Air Transportation; Sources and Uses of Funds in air

Transportation; Financial Control in Air Transportation; Cash Management in Air Transportation; Case Study 1; Case Study 2; Case Study 3; Case Study 4.

SHY544 Airport Safety, Operations and Management 3+0 7.5

Basic Concepts; Airport definition, Airport classifications; Airport Safety: Basic concepts of safety, Safety management; Airport Physical Characteristics: Runway, apron and taxiways, Markings and markers, Lighting; Airport Facilities and Services; Airport Operations: Passenger services, Ground operations and handling, Baggage operations, Ramp, Security, Cargo operations, ARFF, Crisis management, Emergency management, Snow removal, Air traffic services, Wild life management, Disabled aircraft; Airport Commercial Management.

SHY545 Operations Management in Aviation 3+0 7.5

Aviation Operations; Importance of Operations Management in Aviation; Operations Control Center (OCC): OCC Activities, Importance and Role of OCC, Elements of OCC; Crew Planning; Aircraft Assignment; Maintenance Control; Flight Dispatch Process, NOTAM and NAVDATA; Slot Coordination and ATC Coordination; Load Planning; Passenger and Cargo Control; Station Control and OCC Management; State of Emergency and Irregular Operations; Relation Between Cost Control and OCC; OCC Systems.

SHY546 Management and Leadership 3+0 7.5

Management Concept and Functions; Management, Manager, Leader, Management functions; Overview of Leadership Theories; Traits approach, Behavioral leadership theories, Contingency leadership theories; Strategic Management and Leadership; Leadership in Empowerment and Empowerment Practices; Globalization and Leadership; Leadership Practices in Aviation Organizations; Case Analysis.

SHY547 Supply Chain Management in Aviation 3+0 7.5

Logistics and Supply Chain Concepts; Logistics Management; Scope of Supply Chain Management; Structure of Supply Chain and Models; Decisions of Supply Shain; Role of Supply Chain Management in Aviation Business; Integrated Supply Chain Management; Supply Chain and Inventory; Supplier Selection in Supply Chain Management; Reverse Supply Chain Management; Supply Chain Management Practices in Aviation: Airline companies, Airport operators, Ground handling companies.

SHY549 Strategic Management and Planning in Aviation 3+0 7.5

General View of Aviation Industry: Industry stakeholders, History, Regulatory framework, International and national policies; Concepts and Principles of Strategic Management and Planning for Civil Aviation; Transport Policy and Intersystem Coordination; Environmental Analysis in Aviation: Global, regional and national changes, Aviation and society; Strategic Analysis Techniques: SWOT; Strategic Planning and Strategic Thinking: Planning, Plan types, System plans, Master plans; Strategy Formulation: International and national industry level aviation strategies; Corporate, Business and Operational Level Strategies.

SHY551 Contemporary Approaches to Management 3+0 7.5

Concept of Management: Definition of management, functions; Evolution of Management Thought and Practices; Modern Management Approaches; Post-Modern Management Approaches; Core Competence and Competitive Advantage; Outsourcing; Restructuring of Organizations and New Organization Structures; Learning Organizations; Benchmarking; New approaches to Leadership; Total Quality Management; Knowledge Management; Innovation Management; Management in Digital Age: E-Business, Virtual organizations, Network organizations, Business models; Globalization and Strategic Alliances; Governance, Sustainability and Corporate Social Responsibility.

SHY555 Sustainability in Aviation Businesses 3+0 7.5

Concept of Sustainability: Sustainable development, Corporate social responsibility; Sustainability Management in Business: Sustainability strategy, Leadership, Organizational culture, Human resources management; Environmental Innovation and Creativity; The Concept of Sustainable Aviation: Dimensions of sustainable aviation, Responsible stakeholders; Economic and Social Sustainability Goals of Air Transport; Environmentally Sustainable Air Transport; Policies and Regulations for Sustainable Aviation; Sustainability Management at Airports; Sustainability Management in Airlines; Corporate Sustainability for Aviation Businesses.

SHY592 Seminar 3+0 7.5

SHY609 Airport Planning 3+0 7.5

Airport Planning: Airport system planning, Airport master planning, Airport site selection; Impact of Aircraft Characteristics into Airport Design; Financing Airport Construction; Airport Capacity; Demand Forecasting Methods in Air Transportation; Airport Components and Layout; Geometric Design of Airport Airside; Design of Passenger Terminal; Design of Cargo Terminal; Heliport, STOL Port, and Vertiport.

SHY610 Airport Operations and Management 3+0 7.5

Airport Organizational Structure; Airport Revenues and Expenses; Airport Marketing; Service Quality and Its Measurement; Public Relations; Management of Passenger and Cargo Terminal Buildings; Ground Handling of Passengers and Baggage; Airport Capacity And Delay; Sustainable Airports Management; Social Impacts of Airports, Economic impacts of airports, Environmental impacts of airports; Environmental Management System; Airport Privatization; Airport Benchmarking.

SHY612 Corporate Strategies in Aviation Business 3+0 7.5

The Nature of Corporate Strategy: Concepts and approaches; Concentration Strategies; Integration Strategies: Vertical integration and horizontal integration strategies; Diversification Strategies; Geographical Expansion Strategies: Internationalization and globalization strategies; Entry and Exit Strategies; Aviation Industry Analysis: Industry structure, Current trends and problems; Major Drivers of Corporate Strategy in Aviation Businesses; Corporate Strategy Formulation and Execution in Aviation Businesses; Case studies.

SHY613 Fleet Planning and Aircraft Selection Practices 3+0 7.5

General specifications of airline transportation and importance of fleet planning: Structure of market, Types of fleet planning, Fleet planning elements, Fleet planning phases, Financial dimension of fleet planning; Determination of flight network and agreements; Factors İN aircraft selection in fleet planning; Aircraft specifications: Performance specifications, Aircraft characteristics, Technological specifications, Aircraft evaluation; Safety and maintenance in fleet planning; Fleet planning analyses and aircraft selection practices.

SHY615 Current Marketing Practices Air Transportation 3+0 7.5

New Approaches to Airline Marketing; Postmodern Marketing; Value-Based Marketing; Market Orientation; Customer Satisfaction; Niche Marketing; Database Marketing; Direct Marketing; Internet Marketing; Customer Relationship Management; Mobile Marketing; Event Marketing; Social Marketing; Marketing Communications.

SHY617 Simulation and Applications in Aviation 3+0 7.5

Aviation Operations and Simulation Systems; Simulation Usage in Aviation Training; Simulation Accuracy; Physiological Reactions and Simulation; Simulation as a Methodology and Training Tool: High performance required skills training, Part-task training, Landing skills transfer at the beginning of flight training, Decision making, Evaluating efficiency of flight simulators; Evaluating Training by Using Simulation; Relation Between Learning-Motivation-Game; Simulation Environment; Introduction to Simulation Types Being Used in Aviation.

SHY619 Digital Transformation in Aviation 3+0 7.5

E-Business, E-Commerce, Digital Firm Concepts and Tools; New Digital Technologies; Ethical, Legal, Social, Cultural, Economic and Global Dimensions of E-Business; Management of Innovation and Technology; Knowledge Management in Aviation; E-Business Tools; Airline E-Business Applications; Airport E-Business Applications; E-Business Applications in Other Aviation Enterprises; Innovation in Aviation: Innovation Types, New business models; Opportunities, Threats and Problems of Digital Age; Case Studies.

SHY620 Human Resources Applications in Aviation 3+0 7.5

Personnel and Human Resource Management; Human Resource Management Responsibilities; Human Resource Plannig: Factors in forecasting personnel needs; Job analysis; The Recruitment Process; The Selection Process; Building Employee Commintment; Orientation and socialization process; Training and Development; Performance Appraisal; Career Management; Comparsation Management: Basic aspects of compensation, Basic factors in determining pay rates; Personel Discipline.

SHY621 Airline Cost Analysis 3+0 7.5

Decision Making; Measurement of Operations in Service Industry; Cost Concepts and Classifications; Cost Elements of Airlines; Costing Methods; Cost Analysis Methods; Cost Analysis and Investment Decisions in Airlines; Network and routes costs, Fleet and aircraft selection; Price Decisions and Cost Analysis in Airlines; Performance Management and Cost

Analysis in Airlines; Profit analysis for network and route, Aircraft operating costs and profit analysis, Staff cost analysis, Profit analysis for passenger; Cost Analysis Examples for Unexpected Events.

SHY622 Airline Management Strategies 3+0 7.5

Fundamentals of Strategic Management; Fundamentals of Airline Business; Contemporary Management Approaches for Airlines; Costs and Revenues in Airlines; Positioning School for Airlines: Cost leadership strategy, Differentiating strategy, Focus strategy; Airline Business Models; Airline within Airline Strategy; Outsourcing as an Airline Strategy; Effects of the Liberalization on Airline Management; Strategic Airline Alliances; Airline Mergers and Acquisitions; Globalization of Airlines; Revenue Management of Airlines.

SHY623 Micro Organization Theory and Aviation Practices I 3+0 7.5

The Main Paradigms of Organizational Behavior: Organization-human interactions; Individual Characteristics: Cognition, Perception and Individual decision making, Personality and Values, Emotions; Introduction to Organization: Socialization and Organizational Culture; Theories of Motivation; Leadership Theories; Groups and Teamworks; Organizational Policy: Power and Influence; Stress; Positive Organizational Behaviors: Negative Organizational Behavior: Cases and Practices in Aviation Organizations.

SHY624 Organization Theory and Applications in Aviatio 3+0 7.5

Overview of Organization Theory: Organization, theory and organization theory, Historical development of organization theory, Comparative organization theories; Contingency Theory; Resource Dependence Theory: Basic assumptions and basic concepts of resource dependence theory, Management of dependency relations in organizations; Organizational Ecology Theory: Organizational communities, Structural inertia and organizational change, Density dependence, Niche width dynamics, Demographic processes; Economic Theories of Organization: Transaction cost theory, Agency theory; New Institutional Theory; Postmodern and Critical Theory; Applications in Aviation Organizations.

SHY625 Power and Politics in Organization Theories: Applications to Aviation 3+0 7.5

Overview of Power and Politics: Concept of power, The effects of national culture, Dimensions of power and power in organizations, Relationship between power and politics, Political skill, Typology of political behavior in organizations, Antecedents and successors of political behavior, Interpersonal influence tactics and Impression management; Power in terms of Macro Organization Theories; Power and Politics in terms of Micro Organization Theory. Analysis of studies on the aviation industry.

SHY626 Change Management in Aviation 3+0 7.5

Aviation Industry; New Management Approaches in Aviation; Emergence of Change Management Concept; Caos; Change Management and Aviation Industry; Case Study in Aviation in Change Management; Turkey Application Change Management, Change Management Practices Europe, Asia-Pacific Application Change Management, Change Management Practices in North and South America; Understanding Change Management; Change Management and the Future.

SHY628 Micro Organization Theory and Applications in Aviation 3+0 7.5

The Main Paradigms of Organizational Behavior: Organization-human interactions; Individual Characteristics: Cognition, Perception and Individual decision making, Personality and Values, Emotions; Introduction to Organization: Socialization and Organizational Culture; Theories of Motivation; Leadership Theories; Groups and Teamworks; Positive Organizational Behaviors: Extra role behaviors, Positive deviation and Organizational citizenship; Negative Organizational Behavior: Stress, Burnout and Counterproductive behaviors; Organizational Policy: Power and Influence; Practices in Aviation Organizations.

SHY630 Micro Organization Theory and Aviation Practices II 3+0 7.5

Recent Concepts in Organizational Behavior; Psychological Contract; Psychological Capital; Organizational Trust; Organizational Justice; Organizational Citizenship and Organizational Commitment Relationship; Emotional Labor; Mobbing; Organizational Silence and Organizational Cynicism; Burnout Syndrome; Organizational Alienation; Counterproductive Work Behaviors; Glass Ceiling Syndrome; Organizational Identification; Whistleblowing; Cases and Practices in Aviation Organizations.

SHY632 Airline Marketing Strategies 3+0 7.5

Marketing Thought and Strategic Thinking; Marketing Planning in Airlines; Industry and Competitive Analysis in Airlines; Measurement of Market Opportunities and Market Attractiveness Analysis in Airlines; Marketing Strategies for New Products in Airlines; Marketing Strategies for Growth Stage in Airlines; Marketing Strategies for Maturity Stage in Airlines; Marketing Strategies for Decline Stage in Airlines; Marketing Strategies for Market Positions in Airlines; Marketing Strategies to be Applied in Crisis Periods in Airlines; Strategic Control and Evaluation of Marketing Performance.

SHY634 Strategic HR Management and Aviation Applications 3+0 7.5

The Concept of Human Resources Management: Definition, Objectives of the HRM, Characteristics of the HRM; The Concept of Strategy: Definition of the strategy, Phases of the strategy formulation, Relationship between organizational strategy and the human resources function; Concept of Strategic Human Resources Management: Definition of SHRM, Principles, Objectives, Strategic human resources policy and philosophy; Transition from Personnel Management to Strategic Human Resources Management: Globalization, Competition, Future of Strategic Human Resources.

SHY692 Seminar 3+0 7.5

SHY790 Thesis 0+1 30.0

SHY890 Thesis 0+1 30.0

SHY890-0 Thesis (Thesis Proposal) 0+1 30.0

SPY501 Sport Management Approaches 3+0 7.5

Management, Basic concepts, Characteristic of sport activities; Historical Development of Management Science; Early Scientific Period, Scientific management, Movement of scientific management, Management process approaching, Bureaucracy approach; Human Relationship Approach: Research of Hawthorne, Studies of Harwood; Modern Management: System approach, Modern management approach; Sports Management: Basic concepts, Development of sport management, Sport management and manager, Planning in sport management, Organization of sport management, Leadership in sport management, Coordination and controlling in sport management.

SPY502 Sports Economy and Analysis 3+0 7.5

Importance of Economics in Effective Sport Management, Current Issues in Sports Economics, The Economist's General Approach to Issues, Basics Tools: Supply and Demand, Applying Supply and Demand: Optimal Ticket Pricing Strategies, Market Structures: Measuring the Competitiveness of an Industry; Industrial Organization of Sports: Identifying Revenues, Expenses, & Profits, Effects of Revenue Sharing on Team Behavior, Importance of Leagues, Monopolistic Practices of Leagues, Competitive Balance Issues; Labor Economics of Sports: What Determines Players' Salaries?, Attempts to Restrict the Competition for Players: Monopsony, Labor Unions and Labor Relations, Discrimination: Causes, Forms, and Effects; Public Finance and Sports: Competition for Teams across Cities.

SRM501 Ceramic Forming Techniques 3+0 7.5

Ceramic Powder Specifications and their Importance in Terms of Forming; Considerations for Selection of Suitable Forming Techniques; Forming Techniques; Dry Pressing; Isostatic and Semi-Isostatic Pressing; Slip Casting; Pressure Casting; Tape Casting; Extrusion; Injection Molding; Gel Casting; Forming and Densification Techniques; Hot Pressing; Hot Isostatic Pressing; Machining and Finishing Processes; Choosing the Right Equipment Depending on the Problem. Each Forming Technique is Explained as Follows; Advantages and Disadvantages; Selection of Suitable Processing Additives; Equipment; Product Properties; Cost; Possible Defects; Their Cause and Control.

SRM502 Rheological Behavior of Ceramics 3+0 7.5

Definitions of Colloids; Colloidal Systems and Importance of Interfaces; Electric Double Layer; Electrophoretic Mobility and Zeta Potential DLVO Theory and Stabilisation of Slurries; Processing Additives; Water, Organics; Surfactants; Deflocculants; Stability of Clay Systems; Effect of Anions and Cations; Flow and Deformation; Rheologic Behaviours; Pseudoplasticity; Dilatency; Thixotropy; Yield Point; Factors Affecting Viscosity; Practical Usage of Rheological Properties.

SRM503 Dielectric Materials and Devices 3+0 7.5

Transformations and Tensors; Crystals and Texture Symmetry; Curie Principle and Neumann's Law; Polar Tensors; Pyroelectricity; Permittivity; Piezoelectricity; Elasticity; Thermodynamics; Equlilibrium Properties; Axial Tensors; Piezomagnetism; Magnetoelectricity; Pyromagnetism; Magnetic Symmetry-Time Reversal, Hysteretic Properties-Domains; Transport Properties; Thermal and Electrical Conductivity; Galvanomagnetic Phenomena; Thermoelectric Phenomena; Thermomagnetic Phenomena; Waves Acoustics and Optics; Optical Activity.

SRM506 Structure-Property Relationships in Ceramics 3+0 7.5

Introduction to Crystal Structure of Ceramics; Packing of Atoms and Ions in the Crystal Structures (e.g., Fcc, Hcp, Perovskite, Spinel, etc.) and Variation of Physical Properties of Ceramics as a Function of Atom Positions (e.g., Anisotropic Properties, etc.); Point, Line and 3-D Defect Formation in Ceramic Crystals (Ionic and/or electronic Disorders, Defect Chemical Reactions, etc.) and Influences of Those Defects on Physical Properties of Ceramics (e.g., Color and Color Centers, Gas Sensing Ability of Some Ceramics, etc.); Review of Microstructure Development in Ceramics (i.e., Sintering, Capillary Forces, Grain Size and Morphology, Removal of Pores from the Microstructure, etc.) and Influence of the Microstructure on Properties (e.g., Effects of Pore Size, Grain Size, or Grain Boundary on Mechanical, Thermal and Electrical Properties of Ceramics, Secondary Phase Effects on Physical Properties of Ceramics, etc.); Ceramic Materials Selection Criteria for Specific Applications.

SRM510 High Temperature Properties of Ceramic Materials 3+0 7.5

Basics; Chemical Bonds in Ceramic Materials and Their Effect on Mechanical Properties; The Parameters Effecting the High Temperature Properties of Ceramic Materials; High Temperature Properties of Ceramic Materials: Strength, Creep, Fatigue, Oxidation, Corrosion, Mechanical Wear; Application of Ceramic Materials for High Temperature; Improvement of High Temperature Properties of Ceramic Materials.

SRM513 Making of Heavy-Clay Products 3+0 7.5

Introduction; Heavy Clay Product; Building Bricks; Face Bricks And Engineering Bricks; Roofing Tiles; Hollow Floor Blocks; The Raw Materials For Brick And Tile Making; Preparation of Raw Materials; Shaping; Surface Treatment; Cutters; Drying; Firing; Treatment of The Finished Product; Measurement And Control Technology; Quality Control of Products; Planning of Heavy-Clay Plants; Future of Brick as a Building Material.

SRM517 Ceramic Body and Glaze 3+0 7.5

Classification and Production of Ceramics; Earthenware, Stoneware; Sanitary ware; Porcelain and Tiles; Body Composition; Methods of Body Preparation for Shaping in the Liquid; Plastic and Dry States; Glazing; Body-Glaze Relationship; Glaze Composition and Calculation; The Properties of Glazes; Special Glazes; Opaque; Matt; Crackle; Salt; Luster; Crystalline; and Aventurine. Ceramic Colors; Preparation and Application Ceramic Stains and Engobes; Glaze Defect and their Control.

SRM520 Ceramic Tiles and Sanitary ware Production 3+0 7.5

An Introduction to Ceramic Industry; Tiles: Wall Tiles, Floor Tiles, Porcelain Tiles; Raw Materials and Preparation, Milling and Granulation; Pressing, Glazing and Decoration; Sintering and Kilns; Frit Production and Glazes; Product Characterization, Standards and Testing; Sanitary Ware: Products, Raw Materials and Preparation; Production Methods: Slip Casting, Pressure Casting; Slip Preparation and Slip Casting; Drying; Sintering and Kilns.

SRM521 X-Ray Diffraction Techniques in Materials Characterization 3+0 7.5

Importance of Materials Characterization; Importance of XRD Techniques in Materials Characterization; Techniques Used in Materials Characterization and their Difference; Electromagnetic Radiation; The Continuous Spectrum; The Characteristic Spectrum; Absorption; Filters; Production of X-rays; Detection of X-rays; Introduction of the XRD Device; Specimen Preparation Methods; Interpretation of XRD Spectra; Lattices; Crystal Systems; Symmetry; Primitive and Non-primitive Cells; The Stereographic Projection; The Stereographic Projection; Diffraction Theory I: Directions of Diffracted Beams; Diffraction; Bragg Law; X-ray Spectroscopy; Diffraction Directions; Diffraction Methods; Diffraction Under Non-ideal Conditions Diffraction Theory-II: Intensities of Diffracted Beams: Scattering by an Electron; Scattering by an Atom; Scattering by a Unit Cell; Structure Factor Calculations: Multiplicity Factor, Lorentz Factor; Absorption Factor; Temperature Factor; Intensities of Powder Pattern Lines;

SRM526 Ceramic-Metallic Thin Films and Coatings 3+0 7.5

The Semi-Classical Theory of Conduction in Metals and Ceramics and the Electronic Band Structure of Selected Metals and Ceramics; Dielectric Properties of Insulators; Magnetic Ordering; Films-Coatings and Surface Effects; Growth Modes and Zone Models for Coatings and Films; Plasmas; Magneto-Electronic and Mechanical Properties of Selected Metal and Ceramic Films and Coatings.

SRM528 Advanced Composite Materials 3+0 7.5

Introduction; Classification of Composites; Ceramic Matrix Composites; Nano-composites; Laminate Composites; Metal Matrix Composites; The Properties and Conditions Required for Matrix and Reinforcement Phases in Composite Materials; The Effects of Thermal Expansion Mismatch in Composite Materials; Fracture Strength of Composites; Mechanical Properties of Composites; Fracture Mechanisms of Composites; Toughening Mechanisms; Properties of Interfaces and Thermal Stresses; Thermal Shock Parameters; Stress-Strain Behavior of Ceramics with the Addition of Reinforcement Phase.

SRM592 Seminar 3+0 7.5

SRM599 Term Project 3+0 0.0

SRM602 Transmission Electron Microscopy and Interphase Boundaries 3+0 7.5
Importance of Interphase Boundaries; Classification of Interphase Boundaries; Low Angle Boundaries and their Properties; High Angle Boundaries and their Properties; Interphase Boundaries between Different Crystals; Interphase Boundaries between Metal and Ceramics; Techniques to Characterize Interphase Boundaries; Transmission Electron Microscopy; Energy Dispersive X-ray Spectrocopy; Parallel Electron Energy Loss Spectroscopy; Dark Field; Bright Field; Fresnel Defocus and High Resolution Imaging Techniques; Diffraction of Electrons.

SRM604 Ceramic Sensors 3+0 7.5
Physical-Chemical and Technological Principles of Ceramic Sensors; Physical and Chemical Bases of Ceramic Sensor Operation; Technological Principles of Ceramic Sensors; Ceramic Humidity Sensors; Semi Conductive Humidity Sensors; Pore Structure Control and Control of the Sensitivity of Ceramic Humidity Sensors; Testing and Stabilization of Ceramic Humidity Sensor Parameters; Ceramic Humidity Sensors Made of Solid Electrolytes; Ceramic Gas Sensors; Ceramic Alcohol Sensors; Ceramic Oxygen Sensors; Ceramic Sensors for Other Gases; Ceramic Temperature Sensors; NTC-Thermistors; PTC-Thermistors, CTR-Thermistors (Critical Temperature Resistors); Capacitive Ceramic Temperature Sensors; Ceramic Pressure Sensors; Multifunctional Ceramic Sensors; Application of Ceramic Sensors.

SRM606 Structural Advanced Ceramics 3+0 7.5
Importance of Structural Advanced Ceramics; Classification of Structural Advanced Ceramics; General Properties; Processing Techniques and Applications of Non-oxide Structural Advanced Ceramics; Examples for Non-oxide Structural Advanced Ceramics; Silicon Carbide; Silicon Nitride; Sialons, Boron Nitride; Boron Carbide; Aluminum Nitride; General Properties; Processing Techniques and Applications of Oxide Structural Advanced Ceramics; Examples for Oxide Structural Advanced Ceramics; Alumina, Mullite; Zirconium.

SRM608 Ferroelectrics Materials and Devices 3+0 7.5
Crystal Structure and Ferro Electricity; Origin of Spontaneous Polarization; Origin of Field Induced Strain; Electro Optic Effect; Applications of Ferroelectrics; High Permittivity Dielectric; Pyroelectric Devices; Piezoelectric Materials; Piezoelectric Resonance; Piezoelectric Transformers; Ultrasonic Transducers; Surface Acoustic Wave Devices; Piezoelectric Actuators; Ultrasonic Motors; Electrooptic Devices; Wave Guide Modulators; PTC Materials; PTC Phenomenon; PTC Thermistors; Grain Boundary Layer Capacitors; Composite Materials.

SRM609 Scanning Electron Microscopy and Chemical Analysis Techniques 3+0 7.5
Introduction; What is the Importance of Microstructural Investigations?; What are the Reasons for the Use of Electron Microscopes; Which Techniques are Used for the Characterization of Microstructures; Specimen Preparation for Electron Microscopy; Interactions between Electrons and Specimen; Depth of Signals Produced as a Result of Interactions and their Use; Scanning Electron Microscopes (SEM) and its Parts; Chemical Analysis Techniques: Energy Dispersive X-ray Spectrometers (EDX) and Wavelength Dispersive X-ray Spectrometers (WDX); Parameters to be Known to Obtain Best Quality Images and Reliable Chemical Analysis; Comparison with Environmental Scanning Electron Microscopes (ESEM) and Other Techniques; Investigation of Different Materials in SEM.

SRM612 Crystal Anisotropy 3+0 7.5
Introduction and Overview; Permittivity; Polarization Mechanism; Dispersion and equivalent circuits; High Voltage Insulators; Electric Breakdown Mechanisms; Substrates and Packaging; Thick and Thin Film Processing; Resistance; Electronic Conduction; Fixed Resistors, PTC and NTC Thermistors, Varistors and Barrier Layer Capacitors, Humidity and Chemical Sensors; Ceramic Electrodes and Superconductors; Ionic Conduction and Batteries; Capacitors; Disk, tubular, Multilayer; Low k Ceramics: Temperature coefficient, Microwave dielectric resonators.

SRM614 Colloid Chemistry and Reological Behaviour 3+0 7.5
Introduction to Colloid Chemistry and Classification; Colloidal Systems and Importance of Interface; Kinetic Properties; Surface Tension and Surface Energy; Gibbs Adsorption Equation; Adhesion, Cohesion, and Diffusion; Physical Adsorption by Solids; Physical Adsorption by Solids; Langmuir Isotherms; Freundlich Adsorption Isotherm; BET Adsorption Theory; Electrical Phenomena at Interfaces; Electrical Double Layer and Zeta Potential, DLVO Theory; Colloid Stability; Flotation; Surfactants; Wetting; Reological Behaviour; Pseudo Plasticity; Dilatants Flow Behaviour; Thixotropy, Effective Parameters on Viscosity; Reological Applications; Stability of Clay Based Mud; Slip Casting; Ceramic Glazes.

SRM692 Seminar 3+0 7.5

SRM790 Thesis 0+1 30.0

SRM890 Thesis 0+1 30.0

SRM890-0 Thesis (Thesis Proposal) 0+1 30.0

SYR512 Customer Relationship in Sport 3+0 7.5

Definition of Customer Relationship Management in Sports; Components in Customer Relationship Management in Sports; Characteristics of Customer Relationship Management in Sports; Customer Relationship Management Process in Sports; Strategies in Customer Relationship Management; Data Mining; Customer Orientation in Sports; Relationship Marketing; Purposes and Benefits of Customer Relationship Management in Sports; Electronic Customer Relationship Management in Sports; Fan Relationship Management; Electronic Fan Relationship Management; Relationship Quality Concept in Sports; Characteristics of Relationship Quality in Sports.

SYR513 Leisure and Recreation Analysis 3+0 7.5

Etymological Definitions of Leisure; Experiential Definitions of Leisure; Work and Leisure; Uses of Leisure: Essential elements of leisure, Abnormal leisure, Serious, casual and project-based leisure; Leisure and Consumption: McDonaldization or Ikeaization; Yin-Yang Theory in Leisure Researches: Qualitative and quantitative approaches, Uses of qualitative and quantitative approaches in recreation, Objective and subjective approaches; Life Style and Leisure.

SYR514 Brand Management and Sports 3+0 7.5

Changing Competition and Brand: Brand and Branding Process from Past to Present; Basic Concepts Related to Brand: Associations, Awareness, Image, Personality; Brand Management in Sports and Configuration: Brand identity planning models in sports, Communications strategies, Brand positioning in sports and factors affecting brand positioning; Brand Management in Sports and Integrated Communications: Features of sports consumers and brand, Corporate communications and brand management; Case Studies of Sports Brands.

SYR515 Recreation Project Management 3+0 7.5

Project and Introduction to Project Management: What is project?, Classification of projects, What is project management?, The basic functions of project management, Project stakeholders, Project life cycle; Project Initiation: Project initiation document, Identifying stakeholders, Project kick off meeting; Project Planning: Time management, Planning process, Creating an effective project team, Types of cost, Budgeting, Risk management and planning; Execution of the Project; Project planning, Technical management and approaches, Quality management in project; Project Monitoring and Control: Establishment of project monitoring and control system, Monitoring and control of risks; Project Closure; Project closure formats, Sub-processes of project closure, Termination of the project.

SYR516 Leisure Education in Theory and Practice 3+0 7.5

Introduction to Educational Sciences: Culture, Culturalization, Types of education, Teaching, Learning, Education and teaching program; Theoretical Perspective to Leisure Education: Relationship between education and leisure, History of leisure education, Leisure education need in society; Leisure Education Approaches and Applications; Leisure Education Components: Awareness, Motivation, Time management, Social interaction skills, Problem solving; Leisure Education in the World; Original Applications of Leisure Education; Scientific Studies on Leisure Education.

SYR517 Theoretical Approaches on Leisure 3+0 7.5

Historical View on Leisure Education: Leisure in prehistoric ages, Leisure in ancient times, Leisure in middle age, Leisure in new and modern eras; Understanding of Leisure Concept: Time based approaches, Activity based approaches, Quality based approaches, Attitude based approaches; Leisure Theories: Flow theory, Self determination theory, Leisure constraints theory, Serious and casual leisure, Theories on politic ideological values of leisure; Scientific Studies on Leisure: Studies on leisure in the domestic literature, Studies on leisure in the international literature.

SYR518 Research Methods and Applications in Sports Management and Recreation 3+0 7.5

Basic Concepts in Research: Knowledge, Science, Scientific method, Scientific research, Types of scientific research; Basic Concepts in Scientific Research: Assumptions, Structures, Proposition, Variable, Hypothesis, Assumption, Theory; Research Planning Principles: Defining the problem, Determining methods, Concepts related to the universe and sample,

Data types and data collection methods, Data collection and organization; Reporting of Scientific Researches: Types of text writing, references and bibliography; Methods and Contents Used in Sports Management and Recreation Research; International Indexes, Publications and Case Studies in Sports Management and Recreation.678

SYR519 Therapeutic Recreation Program and Practices 3+0 7.5

The Meaning and Importance of Recreation and Sport for the People with Disabilities; Variety, Reasons and Classification of the People with Disabilities; The Effects of Recreative Activities and Sport for the People with Disabilities; Sport and Recreative Activities: Recreation and sport practices for the people with intellectual disabilities, Recreation and sport practices for the people with orthopedic disabilities, Recreation and sport practices for the people with visual impairments, Recreation and sport practices for the people with hearing impairments; Examination of the Literature of Recreation and Sport Practices for the People with Disabilities.

SYR520 TheTherapeutic Recreation Leadership 3+0 7.5

Leadership in Therapeutic Recreation: The meaning of leadership; Basic Leadership Components: Leadership and Power, Basis for Leadership Power and Influence; Leadership Theories: Trait theories, Behavioral theories, Situational theories, İnteractional theories; Leadership Styles: Principles and Methods of Leadership; Qualities and Traits of the Therapeutic Recreation Leader; The Role of the Therapeutic Recreation Leader: İndividual and group leader, Recreational therapy groups and structure, Group elements and relationship, Group dynamic, Evaluation group, Principles for group leadership; Leadership, Activities and Program Planning in Therapeutic Recreation: Goal setting and activity selection, Specialized activities and treatment techniques; Strategies for Growth and Learning in Therapeutic Recreation Leadership: Motivational strategies, Instructional strategies, Growth promoting strategies. 905

SYR521 Sport Consumer Behaviors 3+0 7.5

Introduction to Consumption: Types of consumption; Sports Consumption; Consumer behavior; Theories of Consumer Behavior: Classical Behavior Models, Modern Behavior Models; Consumer Behavior in Sports; Consumer Groups in Sports: Active sports consumers, Passive sports consumers, consumer of tangible sport products, consumer of sport events; Consumer Behavior Model and Components in Sport: External environment, Organizational / organizational environment, Customer context, Brand attitude, Buying behavior and behavioral intention, Post-purchase reactions-evaluations; New consumer trends.

SYR522 Leisure and Ageing 3+0 7.5

Leisure and Time; The İmportance of Leisure; Leisure Throughout Life Cyle: Lifestyle and leisure, Leisure need of older adults; The Ageing: Biological processes, Cognitive processes, Psyhological ageing; Theoretical Perspectives on Ageing and Leisure İnvolment: Leisure patterns, Constraints and social support; The Importance of Leisure; Leisure Benefits on Ageing; The Leisure Experience: Meaning and motivations on ageing; Planning a Leisure Lifestyle: Leisure in retirement.

SYR523 Leisure and Consumer Culture 3+0 7.5

Leisure Industry. In Consumer Society: Contemporary patterns, Leisure and Cultural structures. Participation in Leisure Activities: Identity, Gender, Social class, Race and Ethnicity effect. Evaluation of Participation Forms in Leisure Activities in Different Societies. Urbanization, Mass Media. Economic, Environmental and Political Analysis of Leisure Culture. 363

SYR525 Leisure and Healthy Living 3+0 7.5

Disadvantages of Still Life. Quality of Life and Sports of All Ages: The main goals of exercise, Scientific foundations of quality of life. Sport as a Leisure Tool. Effects of Regular Lifelong Sports Practices on Human Health; Aerobic exercise, Life-long sports applications. Exercise Examples: Obesity and exercise, Weakness and exercise, Children and sports. Exercise Programs That Can Be Recommended in Healthy Life Activities.

SYR592 Seminar 3+0 7.5

SYR601 New Trends in Recreation 3+0 7.5

Leisure Education; Postmodernism and Leisure; Recreation and Brain Plasticity; Correctional Recreation; Emotions and Recreation; Electronic Leisure; Social Media and Recreation; Religious Recreation; Hedonic Recreation; Serious and Casual Leisure; Project-based Recreation; Deviant Leisure; Spa and Wellness Recreation; Conspicuous Leisure; Forensic Leisure; Space Recreation; Flow Theory in Recreation; Recreational Shopping.

SYR610 Event Planning and Project Management 3+0 7.5

An Overview of Sports Events and Planning; Structure and Types of Sports Events; Development of Sports Organizations; Phases and Planning of Sports Organizations and Events; Project Management and Basic Terms Related to Project Management; Effective Project Management Techniques; Characteristics of Project Management and a Project Manager; Process of Project Management: Planning, Monitoring; Control Related Methods, Approaches, Applications; Project Teams; Project Budgeting.

SYR611 Contemporary Approaches in Sport Management 3+0 7.5

An Overview of the Concept of Management; Concept of Organization and Its Importance; Classical and Neoclassical Management Approaches; Contemporary Management Approaches and Contingency Theory; System Approach; Characteristics of a System; System Model; Post-modern Management Theories; Transformational Management and Transformational Leadership; Learning Organizations; Coaching Style Management Approach; Charismatic Leadership Approach; Effects of Contemporary Management Approaches on Sports.

SYR612 Modern Sport Marketing Applications 3+0 7.5

Paradigm Changes in Marketing; Analysis of Environmental Changes Influencing Marketing in the New Era; Projections Towards Sports Marketing; Newly Emerging Areas of Marketing in Sports Business; Relationship between Management and Customer Relationship Marketing (CRM) in Sport; Database Marketing and One-to-One Marketing; Data Mining Application in Sport Contexts; Consumer Behavior Models in Sports; Electronic and Mobil Sports Marketing Applications; New Sports Marketing Trends in the Future.

SYR614 Risk Management in Sport Organizations 3+0 7.5

Relationships Between Sport Organizations and Risk Management; Identification of Risks; Valuation: Valuation of Risk; Decision Making and Risk Management; Problems in Risk Management; Developing and Implementing Risk Management; Medical Emergency Action Plans; Protecting Children; Lightning Safety; Drug Testing; Equipment, Premises, Construction and Supervision; Ground Safety; Insurance in Sports Activities and Its Applicability.

SYR615 Stratagic Sport Communication 3+0 7.5

Relationships Between Sports Management and Sports Communications; Growth and History of Sports Communication; Strategic Sports Communication Model (SSCM) in Sports Communication; Personal Sports Communications; Organizational and Leadership Communication in Sports; Integrated Marketing Communications in Sports; Publishing and Print Communication in Sports; Electronic and Visual Sports Communications; Online Sports Communication and New Sports Media; Social Media; Sports Advertising; Public Relations and Crisis Communication in Sports; Sports Communication Research.

SYR617 Measuring Tool Development 3+0 7.5

Definitions of Questionnaire and Scale; Preparing Questionnaire and Scale; Performing Questionnaire or Scale; Determining Sample; Sources of Bias; Definition of Validity an Types: Content validity, logical validity, Concordance validity, Construct validity, Definition of Reliability: Reliability testing techniques and estimations, Item Analysis; Exploratory factor analysis: Assumptions and techniques, Factor loadings, Rotation techniques, Confirmatory factor analysis: Assumptions and techniques, Practice.

SYR618 Recreational Leadership 3+0 7.5

Leadership Basic Concepts, Leadership Formation, Leadership Natural Structure, Leadership Definition; Hierarchical Level Leadership, Leadership Approaches, Properties Approaches, Behavioral Approach, Situational Approach, Leadership Functions; Leadership Requirements Basics; Leadership Factors Influencing Variables, Recreation Leadership, Working areas, the Recreation Leader Responsibilities.

SYR619 Leisure Economics and Applications 3+0 7.5

Economic Analysis of Organizations; Activity dimensions, Mass participation, Social dimensions. Economic Effects of Participation Dimensions; Modeling, Consumer preferences. Public and Private Sector Analysis; Theoretical and practical examples, Expenditure, Economic effects, Market structure, Pricing, Materials. Volunteers; Profile, Dimensions, Restrictions. Motivation Elements. Evaluation of Local Government Examples.

SYR621 Psycho-Social Issues In Leisure Research 3+0 7.5

Relationship Between Psychology And Leisure: Personality and leisure, Subjective well-being and leisure, Satisfaction and leisure, Emotional disorders and leisure, Stress and the role of leisure in stress management; Relation of Sociology and Leisure: Gender and leisure participation, Socio-economic factors and leisure participation, Social problems and leisure participation; Psychosocial research with theoretical basis: Basic theories of psychology and leisure research, Basic sociology theories and leisure research; Specific Applications In Leisure-Time Psycho-Social Issues; Academic Research On Psycho-Social Issues For Leisure.

SYR623 Strategic Human Resources Management and Applications 3+0 7.5
The importance of human resource management strategies in globalizing world; Analyzes and applications for people working in sports facilities; Case studies of recruitment strategies in sports facilities; Performance evaluation strategies and applications in sports organizations; Investigations related to employment and job areas in sports organizations.356

SYR625 Sustainability in Sport Management and Recreation 3+0 7.5
Introduction to Sustainability: Basic dimensions of sustainability, environmental sustainability, social sustainability, economic sustainability, sustainable development; Relationship between Sport and Sustainability; Relationship between Sport Management and Sustainability; Sustainability in Sports and Recreation Activities; Sustainability in Sports Facilities: Sustainable facility management within the social, environmental and economic dimensions; Sustainable Approaches in Sports Organizations: sustainability practices in national and international organizations, case studies.

SYR627 Customer Relationship Management Strategies and Applications 3+0 7.5
Analysis of the effectiveness of relational marketing; Effective relational marketing components; Analyzing strategies and practices related to customer relationship management; Six critical success factors in managing customer relations; Fan relationship management strategies in sports clubs; Examining the strategies and applications related to the management of electronic customer relations in sports organizations and introducing new ideas.

SYR629 Management in Therapeutic Recreation Services 3+0 7.5
Therapeutic Recreation Management:Characteristics of management, Theories of management, Functions of management; Therapeutic recreation manager: Leadership, Leadership teories and styles, Integrative leadership, Vision, Mission, Philosophy and objectives, Organizational behavior in therapeutic recreation; Operational Management: Financial management and budgets, Decision making, Problem solving and conflict management, Therapeutic recreation and marketing; Human Resource Management: Effective communication, Motivation, Performance appraisal, Staff training and development; Consumer Management: Service delivery management, Risk management, Quality service management.

SYR692 Seminar 3+0 7.5

SYR790 Thesis 0+1 30.0

SYR890 Thesis 0+1 30.0

SYR890-0 Thesis (Thesis Proposal) 0+1 30.0

TAÇ701 Thesis Research Study Course 3+0 7.5
Introduction: The Laboratory/Studio Facilities; Teaching Staff; Expectations from Graduates within the Framework of Qualifications for Master of Science; Interdisciplinary Studies and Their Importance; Laboratory/Studio Planning; Scholarships and Project Opportunities; Scientific Research projects, National and International projects/competitions, Industry oriented projects; Project Writing, Managing and Concluding; Determining a Research Question; Patent / Design Registration Research and Writing; Scientific Databases; Journal's Impact Values and Importance; Writing Articles; Plagiarism Software Programs.

TAÇ801 Thesis Research Study Course 3+0 7.5
Introduction: The Laboratory/Studio Facilities; Teaching Staff; Expectations from Graduates within the Framework of Qualifications for Phlisopy of Doctorate; Interdisciplinary Studies and Importance; Laboratory/Studio Planning; Scholarships and Project Opportunities; Scientific Research Projects, National and International projects/competitions, Industry Oriented Projects; Project Writing, Managing and Concluding; Determining a Research Question; Patent/Design Registration Research and Writing; Scientific Databases; Journal's Impact Values and Importance; Writing Articles; Literature Review; Plagiarism Software Programs.

TER501 Advanced Thermodynamics 3+0 7.5
Summary of Thermodynamics: First Law of Thermodynamics, Second Law of Thermodynamics, Entropy, Analysis of The Second Law of Thermodynamics, Gas Power Cycles: Brayton Cycle,The Brayton Cycle With Regeneration, The Ideal Jet-Propulsion Cycle; Thermodynamic Property Relations; Gas Mixtures: The Ratio of Mole and Mass of a Gas Mixture, P-V Behavior of Gas Mixtures, Properties of Gas Mixtures; Gas-Vapor Mixtures and Air Conditioning: Dry and Atmospheric

Air, Specific and Relative Humidity of Air; Chemical Reactions: Fuels and Combustion, Theoretical and Actual Combustion Processes.

UBE901	**Research in Area of Specialization**	**5+0**	**7.5**
UBJ701	**Research in Area of Specialization**	**3+0**	**4.5**
UBJ702	**Research in Area of Specialization**	**3+0**	**4.5**
UBJ901	**Research in Area of Specialization**	**5+0**	**7.5**
UBJ902	**Research in Area of Specialization**	**5+0**	**7.5**
UBM701	**Research in Area of Specialization**	**3+0**	**4.5**
UBM702	**Research in Area of Specialization**	**3+0**	**4.5**
UBM901	**Research in Area of Specialization**	**5+0**	**7.5**
UBM902	**Research in Area of Specialization**	**5+0**	**7.5**

UCS506 Methods of Numerical Analysis 3+0 7.5

Linear Transformations: Approximation and matrices; Linear Geometry: Lines and Vectors; Linear Geometry in Space and Perspective; System of Linear Equations: Gauss and Gauss-Jordan Elimination Methods; The Rank of a Matrix and The Simplex Algorithm; Basic Matrix Algebra: Matrix multiplication and its properties; Determinants; LUFactorization; The Key Subjects of the Linear Algebra;Linear Composition and Subspaces; Linear Independence; Basis and Dimension; Vector Geometry: Scalar Product; Angles and Projections; Vector Product; Eigenvalues and Eigenvectors; Eigenspaces and Diagonalization; Symmetric Matrices and Probability Matrix; Matrices and Linear Transformations; Change of Basis, Orthogonalization and The Least Square Method; Orthogonallity and the Gram- Schmidt Orthogonalization Method; Orthogonal Projections.

UCS508 Interpretation and Analysis Techniques on Geographic Information Systems 3+0 7.5

The Quality of Graphic Data; Graphic Data Preparation for Analysis And Modeling Studies, Topological Analysis Applications: Neighborhood Relationship, Location Modeling Techniques; Raster and Vector Data Interactions with Database; Recoding Analysis on Raster and Vector Data; Physical Interactions Between Graphic Data: Union, Subtraction and Intersection and Neighborhood Relationship Between Vectoral Areas; Three-Dimensional Analysis and Modelling Techniques; Evaluation of the Data in Three-Dimensional Space; Data Interpolation Techniques In Two-dimensional (pixel) and Three-dimensional (voxel) Space Analysis and Modeling on Topographic Surfaces: Analysis of Slope, Aspect and Visibility, Evaluation of Elevation.

UCS511 Remote Sensing and Geographic Information Systems Techniques in Disaster Management 3+0 7.5

What is Natural Disaster?; Types of Natural Disaster: Flood, Landslide; Earthquake; Remote Sensing Applications after Disaster; The Relationship between Emergency Management and GIS at Disaster; Using of Disaster Related Data in GIS; Use of RS and GIS for Geotechnical Research Regarding Earthquake; Use of GIS in Seismic Risk Analysis: Use of GIS for Regional and Local Analysis; Use of GIS Before and After Earthquakes.

UCS512 Special Topics in the Natural Resources Management with the Use of GIS 3+0 7.5

Application of GIS for Different Natural Resources; Software and Hardwares Used for Natural Resources Management; Data Types for Geological and Mining Fields; Spatial Data Modelling: Raster Model, Vector Model; Attributes Used in Natural Resources; Spatial Data Structures in GIS; Use of Natural Resources Data in GIS; Using Different Formatted Data in the Same Project; Topology Concept; Map Analysis by Using GIS; Third Dimension in the Natural Resource Analysis; 3-Dimensional GIS; 3-D Modelling of Drilling Logs; 3-D Analyse and Interpretation.

UCS513 Special Topics on City Information Systems 3+0 7.5

General Concepts for Planning and Design Terms; City Planning System; Planning Information Systems; Data Resources: Raster data, Vector data, Surveys; Base Map for City Information Systems: The layers for base map production according to the study coverage, Base map production techniques using GIS capabilities, Thematic maps as base maps for city information systems; GIS Aided Decision Making Mechanisms For City Information System; Inventory Preparation For City Planning System, Important Analyses Techniques Used For City Information Systems; Computer Support On Decision Making Progress.

UCS514 Environmental Management and Integration With Geographical Information Systems 3+0 7.5

GIS Use for Air Quality Management: GIS Use for Air Pollution Inventory Studies; Preparation of Pollution Maps And The Clean Air Plans; GIS As A Tool For Water Quality Management; Water Quality Monitoring Studies On The Lake, River And Sea and Preparation of The Water Pollution Maps; GIS Use For Waste Management: Selection of the landfill area and monitoring of the pollution originating from the landfill area using GIS; Importance of the GIS applications for Solution of The Environmental Problems; GIS applications for Environmental Impact Assessment (EIA).

UCS519 Automated Mapping and Facility Management Systems 3+0 7.5

Computer Aided Two Dimensional Drawing Applications; Proper CAD Drawing Preparations Techniques for Geographical Information Systems: Drawing cleanup, Creating topology; Proper Geo-data Base Preparation for AM/FM Systems: Preparation of database, Linking the data; Surveying for mapping purposes; Application Development for AM/FM System: Application development for automated mapping, Application development for facility management; Examples for AM/FM System Studies.

UCS525 Digital Photogrametry 3+0 7.5

Principles of Photogrammetry; Optics on Photogrammetry; Stereoscopic Vision; Principles of Stereo Photogrammetry; Preparation of Flight Plan to Take Aerial Photographs; Photogrammetric Triangulation; Digital Photogrammetry and Digital Map; Orthophoto.

UCS527 Multicriteria Decision Making Methods 3+0 7.5

Introduction to Multiple Criteria Decision Making Analysis; Components of MCDM Methods: Decision making concept and methodology, analytic hierachy process and principles, analytic network process and principles; Combined Application of Geographic Information Systems (GIS) and Multiple Criteria Decision Making Methods; GIS and MCDM Applications on Environmental Decisions; Software Applications in AHP and ANP.

UCS533 Fundamentals of Mapping and Geographical Information Systems 3+0 7.5

Essential Definitions for Mapping; Surveying; Measurement Units; Angle Units; Arc Units; Unit Conversion; Scale; Measurement Errors and Reason of Error Increase; Simple Measurement Instruments and their Use; Area Calculation; Volume Calculation; Vertical Coordinate System; Projection; Map Sheet Names; Basic Map Features; Topographic Maps; Photogrametry; Photogrametry Applications; GPS Usage; Definition of Geographical Information Systems; Planning; Spatial Data Processes; Map Data and Elements; Digital Map; Layer Sense; Graphical Data and Properties; Topology; Elements of Topology; General Topology Concept; Topology Data Model; Analysis Functions; Classification; Feature Class Definition and Database; Database Approaches and Designing of a Database; Database terminology; Database models.

UCS534 Geostatistics 3+0 7.5

Probability; Normal Distribution Test; F Test; Variance Analysis; Chi-Square Test; Regression of Least Squares; Map Analysis; Geologic Maps; Distribution of the Points; Contouring; Trend Surfaces; 4 Dimensional Trend Surfaces; Moving Environments and Kriging; Comparison of the Maps; Data Analysis with Multiple Variables; Multiple Regression; Discriminant Analysis; Grouping Analysis; Factor Analysis.

UCS535 Integration of Geographic Information Systems and Global Positioning Systems 3+0 7.5

Introduction to Global Positioning System (GPS): Principals of System Operation; GPS Segments: GPS space segment, GPS control segment, GPS user segment; GPS Signal Structure; GPS Performance and Error Effects; Differential GPS; GNSS, GLONASS, GALILEO; Augmentation systems: WAAS, EGNOS, MSAS; GPS Navigation Applications: The utility

of GPS on land, Navigation with GPS and a map, GPS navigation with or without a compass; Principals of Outdoor GPS Operation; The Use of Outdoor GPS and Applications; Evaluation of Received Data from GPS and Integration with GIS Graphical Database

UCS536 Remote Sensing 3+0 7.5

History of Remote Sensing; Database Structure ; Spectral Resolution; Basic Image Processing Analysis; Remote Sensing Methods; Parameters in the Visual and Digital Image Analysis; Model Building for Remote Sensing Projects; Remote Sensing Satellites; Material and Electromagnetic Wave Interaction in Remote Sensing; Spectral Reflectance Properties of Objects; Evaluation of Softwares and Hardwares for Remote Sensing; Properties of obtaining color images; Obtaining of screen view; Statistical Analysis Techniques for Remote Sensing Studies; Geometric and Radiometric Correction of Remote Sensor Data; Image Enhancement; Classification Techniques in Remote Sensing.

UCS537 Geographic Information Systems in Social Sciences 3+0 7.5

Thinking spatially in social sciences; Spatial analysis at individual and household levels: micro level spatial modeling; Neighborhood level analysis; Region level analysis; Spatial analysis of regional income inequality; The role of spatial analysis in demographic research; Geographical approaches in reconstructing past human behavior from prehistoric roadways.

UCS538 Geographic Information Systems and Health 3+0 7.5

Introduction to GIS and health research; Spatial statistics and analysis of health data; Statistical methods and spatial epidemiology; Health research and geographical data base; Modeling spatial variations in air quality using GIS; time geography and health; GIS and public health; Improving health need assessment using patient register information in a GIS; Applications: Atlas of Turkey Mortality Maps.

UCS542 Raster and Grid Modeling on Remote Sensing 3+0 7.5

Properties of Raster and Grid data. Data Sources and Techniques of Data Production. Point, Line, Poligon Projections on Data Formats. Geographic Sensitivity and Resolution. Change Detection Based on Time for Same Coordinate. Digital Elevation Model Practices. Algebraic Functions Used for Data Modelling. Grading and Recoding in Data Analysis; Multifactor Modelling Techniques.

UCS543 Applications of New Technologies in Geographic Information Systems 3+0 7.5

What is geoinformaticts? Geodatabase structures On-line data collection for GIS What is GPS? GIS and GPS integration Applications for GIS and GPS integration: Mobile tracking What is wireless sensor networks (WSN)? Wireless sensor network applications: Pollution mapping, noise mapping

UCS544 Seismic Data Acquisition Techniques and Quality Control 3+0 7.5

Seismic sources and receivers. Field configuration in seismic refraction and reflection methods. Acquiring land and marine seismic data. 3-D data acquisition techniques in seismic reflection. Seismic data quality control and criteria.

UCS545 Bore-Hole Seismic Methods and Professional Software 3+0 7.5

Bore-hole seismic sources. Bore-hole three-component geophones and hydrophones. Sonic and density logs. Down-hole and up-hole shooting methods. Determination of seismic P and S wave velocities. Generating synthetic seismograms and correlation. Related professional software.

UCS546 Seismic Tomography and Professional Software 3+0 7.5

Essentials of cross-hole tomography. Generation of coefficient matrices. Methods of matrix inversion: Singular-value-decomposition, Gauss-Newton method, damped least-squares and Lagrange coefficient, rank deficiency. Related professional software.

UCS547 Seismic Surface Waves 3+0 7.5

Properties of body and surface waves. The concept of absorption and dispersion. Absorptive and dispersive properties of surface waves. Surface waves in earthquakes, structure ground interaction.

UCS548 Data-Processing in Seismic Refraction Methods and Professional Software 3+0 7.5

Concept of critical angle and critical distance. Horizontal single-layer problem. Horizontal multi-layer problem. Dipping-layer problem. Blind-layer, hidden-layer problems. Intercept-time, cross-over distance, and time-distance equation solutions. Delay-time method. Related professional software.

UCS549 Data-Processing in Seismic Reflection Methods and Professional Software 3+0 7.5
Concept of shot-gather and CDP-gather. Digital filters and gain. Data editing and muting. Geometry definition. Static and dynamic corrections. Velocity analysis and stacking. Deconvolution and migration processes. Time-to-depth conversion. Related professional software.

UCS550 Seismic Interpretation and Professional Software 3+0 7.5
Factors affecting the seismic wavelet, Geometrical spreading, reflection and transmission coefficients, seismic absorption, interference; Pitfalls in seismic interpretation: Velocity pull-up, velocity pull-down Multiples. Definition of bright-spot, dim-spot, flat-spot. Related professional software.

UCS551 Seismic Stratigraphy and Tectonics 3+0 7.5
Display of seismic sections. Concept of vertical and horizontal resolution. Incident-angle dependency of the reflection and transmission coefficients. Terms used in seismic stratigraphy: On-lap, top-lap, down-lap, truncation surfaces, etc. Determination of normal, reverse and strike-slip faults.

UCS552 Satellite Technologies and Communication 3+0 7.5
Satellite Types and Orbits; General Principles of Satellite Telecommunication; Satellite Platforms; Introduction of Satellite Sub-Systems: Payload (Transmitter Sub-System); Electrical Power Sub-System; Impulse Sub-System; Avionics and Location Control Sub-System; Thermal and Structural Sub-System; Process and Tests of Satellite Production; Launching Services; Satellite Location Control Systems

UCS553 Satellite Managership 3+0 7.5
Fundamental Principles of Satellite Managership; Individual and Institutional Services Presented via Satellites; Competition and Cooperations in Satellite Managership; Marketing Strategies in Satellite Managership; Contact Administration in Satellite Managership; Customer Relations Management in Satellite Managership; Satellite Managership in the World and Satellite Producers: Countries that have Satellite Managers and their Numbers; Leading satellite producers in the world; Firms that provide launching service; Satellite Purchasing and Ensuring

UCS554 Geodatabase 3+0 7.5
Basic Database Concepts: Database Management System, Database Components, Database model; Spatial Data Models: Geodata, Geoinfo, Steps of geodatabase establishment; vector data model: Attribute Domains, Topological relations, Feature Dataset; Raster Data Model: Resolution, Pixel value, Raster dataset, Raster catalog, Mosaic Dataset; Extraordinary Structures in Geodatabase: Annotation and Dimension Feature Class, Network dataset, geometric network; Topology in Geodatabase: Topology Rule Table, Topology rules for features; Geodatabase Design: Data Model for Geodatabase.

UCS555 Theoretical Basics of Remode Sensing 3+0 7.5
Introduction to Remote Sensing; Remote Sensing System; Electromagnetic Energy and Electromagnetic Spectrum; Spectral Properties of Objects; Sensing Systems in Remote Sensing; Sensing Platforms in Remote Sensing; Optical Remote Sensing; Thermal Remote Sensing; Microwave Remote Sensing; Digital Image Processing; Classification; Supervised Classification; Unsupervised Classification.

UCS556 Use of Geographic Information Systems in Planning 3+0 7.5
Effective Management ofing Natural Resources Effectively; Global Environmental Issues; Global Climate Change; Wars and Terror; Refugee Issues; Physical Planning in Sustainable Development and DevelopmentProgress; What is Physical Planning;: For what purpose it doWhy is it Done; Legal Legislation on Physical Planning in Our Country; National Planning Hierarchy; Physical Plan Types; Utilization of Geographic Information Technologies in Planning.

UCS557 Microzoning 3+0 7.5
Basic concepts of Micro-Zoning: Hazard, Risk, Scale; Natural and Technological Disasters: Definition of disaster, Types and causes of disaster, Disaster effects; Disaster Management: Phases of disaster management, Risk management, Crisis management; Micro-Zoning and Hazard Analysis: Fundamentals of micro-zoning, Phases of micro-zoning; Micro-Zoning and Geographic Information System: Data model design and geospatial data input, Spatial Predic-tion.

UCS558 Use of Geographic Information System in Local Governments 3+0 7.5
Basic GIS InformationKnowledge; Concept of Spacetial and Spatiality; GIS and Spatial Thinking; Examples of National Spatial Information System; Local Governments and Their Primary Functions; Use of GIS in Local Governments; Studies on the Development of Urban Information System Standards; Sample Urban Information System Applications; GIS Based Applications that can be Developed with City Urban Information System.

UCS559 Spatial Statistics 3+0 7.5
Concepts: Description, Inference, Classical Descriptive Statistics (Univariate), Classical Descriptive Statistics (Bivariate); Centrographic Statistics; Mean Center, Centroid, Weighted mean center, Standart distance deviation; Point Pattern Analysis:

Quadrat Analysis, Kolmogorov-Smirnov (K-S) test, Nearest Neighbour Analysis; Spatial Autocorrelation (One Variable): The weights matrix, Join-count statistic, Moran's I, Geary's C Ratio, General G, LISA; Correlation and Regression (Two Variables): Standard, Spatial.

UCS560 Database Usage in Geographic Information Systems 3+0 7.5
Basic Concepts: Data, KnowledgeInformation, Spatial Data, Spatial Knowledge; Introduction to Database; Database and Spatial Database; The Place of the Database in Geographic Information Systems; Spatial Data Model; Vector Data Model in Spatial Database; Raster Data Model in Spatial Database; Spatial Database Components; Types of Query; Queriesy Based on Attribute Data; Queriesy Based on Spatial Data.

UCS563 Geographical Information Standards and Basic Legislation 3+0 7.5
The Standard Concept of Standard; The Importance of Standards; Relationship between Information Technologies and Standard Relations; Standard Needy for Standards and Basic Problems in GIS; International GIS Standards and Significant Initiatives; National GIS Standard Development Studies; National GIS Professions and Standards; National Legislation on GIS; Evaluation of Legislation; Spatial Applications and Use of GIS within National Legislation.

UCS564 Disaster Management 3+0 7.5
Basic Concepts: Hazard, Risk, Risk Estimation, Vulnerability, Disaster, Urban Resistance; Hazards: Introduction;, Hazard definition and hazard identification, Hazard analysis, Natural hazards, Technological hazards; Risk and Vulnerability: Probability of risk, Result of risk, Risk assessment, Physical profile, Social profile, Environmental profile, Economic profile, Risk perception; Risk Reduction; Preparedness; Intervention; Rehabilitation.

UCS565 Introduction to Geographic Information Systems 3+0 7.5
Fundamentals of Geographic Information Systems (GIS): Concepts of Ddata, Geographic Ddata, Information and Iinformation Ssystems; Definition of GIS; History of GIS; Components of GIS; Spatial Reference Systems: Concepts of Ddatum and Ggeoid; Projection Systems; Coordinates Systems; GIS Data Types and Models: Attributes and Sspatial Ddata, Raster and Vvector Ddata Mmodels, the Concept of Topology concepts and its Rrules; Application Areas of Use of Geographic Information Systems.

UCS566 Geographical Information System Applications in Disaster Management 3+0 7.5
Introduction to Geographical Information Systems: Geographical information system technology for disaster and emergency management; Natural and Technological Hazards; General An Overview of Disaster Management Legislation; Risk Estimation and Microzonation; Infrastructure Design for Seismic Microzonation Using Geographic Information System; Evaluation and Completion of Data; Mapping of the Raw Data; Application of Seismic Microzonation Maps to Urban Master Plans.

UCS567 Introduction to Remote Sensing 3+0 7.5
Basic Concepts of Remote Sensing: Definition, History; Components of Remote Sensing; Electromagnetic Spectrum: Spectral signature of objects; Sensor Systems of in Remote Sensing: Sensors systems and platforms, Satellite systems and orbits; Remote Sensing Types: Optical remote sensing, Thermal remote sensing, Mmicrowave remote sensing; Digital Image Processing: Digital image specifications, Resolution concept, Image processing, Classification; Application Areas of Use of Remote Sensing: Land applications,; Water Applications,; Air and Atmospheric Applications.

UCS568 Statistical Applications in Geographical Information Systems 3+0 7.5
Basic Statistical Concepts: Definition, Derivation, Classical descriptive statistics (Single Variable), Classical descriptive statistics (Two Variable); Central Weight Statistics; Center Average, Centroid - center of gravity, Weighted average center, Standard distance deviation; Point Pattern Analysis: Quadrat Analysis, Nearest Neighbor Analysis; Spatial Autocorrelation; Correlation and Regression (Two Variable): Standard, Spatial.

UCS569 Computer Aided Mapping 3+0 7.5
Basic Cartography InformationKnowledge; What is a Map?; Map Components; Map Design; Map Sheet Segmentation; Map Labeling; Map Projections; Map Projection Selection; Deformation; BÖHHBÜY Regulation; Software Usage; Software Usage; Software Architecture; Basic Commands; Editing Commands; 2D and 3D Modeling Commands; Data Transformation Commands; Project Design; Design of Map Elements; Submission of Maps as Output.

UCS571 Open Source Geographic Information Systems Applications 3+0 7.5
Open Source Software Useding at GIS: Introduction and software architectures; Software Functions; Data Productioning: Raster georeferencing, Database design, Creating layer; Vector Data Productioning; Queries: Attributes queries, Spatial queries; Transformations: Projection transformations, Data format transformations; Thematic Map Productioning: Related Ttable and spatial data association, Producing different types of thematic maps; Vector Based Spatial Analysis; Raster Based Thematic Spatial Analysis; Producing LayoutOutputs: Generating graphics and report, Producing map layoutoutputs.

UCS572 Remote Sensing and Geographical Information Sytems in Environmental Management 3+0 7.5

Introduction to Environmental Management; What is Environmental Management?; Components of Environmental Management; Environmental Legislation; Environmental Impact Assessment; Strategic Environmental Assessment; Risk Assessment; Life Cycle Analysis; Water Quality Management; Air Quality Management; Waste Management; Use of Geographical Information Systems in Environmental Management; Use of Remote Sensing in Environmental Management.

UCS573 Open Source Remote Sensing Applications 3+0 7.5

Open Source Software Useding in Remote Sensing: Introduction and software architectures, Software functions; Satellite Image Specifications; Image Preprocessing: Geometric correction process, Radiometric correction process; Satellite Image Analysis Methods: Arithmetic band operations, Vegetation indices, Principle components analysis, Spatial filters; Classification of Satellite Images: Unsupervised classifications, Supervised classifications; Topographic Analysis: Producing of slope, aspect, Shaded relief and contour map; Model Development for the Purpose of Study; Creating a Map Output.

UCS574 Map Production and Use 3+0 7.5

Map introduction: Introduction to map features; Determination of working methods; Introduction of software and hardware; Introduction of map elements; Map production: Map production methods; Determination of rules in map production; Map generation from remote sensing data: Obtaining data; Use of Data; Internet-based cartography: use of Internet data; On-line Map production.

UCS575 Spatial Analysis 3+0 7.5

Introduction to Spatial Analysis Methods; Buffer Zone and Proximity Analysis; 3D Surface Creation; TIN, DEM, DSM and DTM Concepts; Slope, Aspect, Visibility etc. Analysis; Three Dimensional Surface Analysis; Density Analysis; Continuous Surface Generation from Point Data; Spatial Interpolation; Weighing with Inverse Distance Weighted; Reclassification Techniques; Registration Overlay Analysis; Optimal Place Selection Analysis.

UCS576 Data Mining in Remote Sensing 3+0 7.5

Data Mining: Data, introduction to data mining concepts; Classification of Data; Classification Methods; Clustering Methods; Remote sensing data analysis: Data acquisition; Applications with remotely sensed data.

UCS577 Basic Programming and Introduction to Python Language 3+0 7.5

Basic programming: Basic Concepts in Programming; Data Types; Variables; Conditions; Error Catching; Object Oriented Programming: Classes; Methods; Data Analysis: Image Processing; Machine Learning; Advanced Applications with Python.

UCS578 Digital Elevation Models and Applications 3+0 7.5

Representation of Digital Elevation Surfaces, Digital Elevation Models, Digital Elevation Modeling; Elevation Descriptors and Sampling Strategies; Acquisition Techniques for Digital Elevation Model Source Data: Photogrammetry, Radargrammetry and SAR Interferometry, Airborne Laser Scanning (LIDAR); Digital Surface Modeling: Approaches for Digital Surface Modeling, The Continuity of Digital Elevation Model Surfaces, Triangular Network Formation for Surface Modeling, Grid Network Formation for Surface Modeling; Quality Control in Elevation Data Acquisition; Accuracy of Digital Elevation Models; Visualization of Digital Elevation Models; Interpretation of Digital Elevation Models; Applications of Digital Elevation Models.

UCS582 Evaluation of Climatic Factors and Bioclimatic Comfort 3+0 7.5

Conceptual Fundamentals: Climate, Climate classes, Bioclimate comfort; Climate Indexes; Urban Business Island Types and Measurement Approaches; Thermal Remote Sensing Platforms of Urban Areas: Platforms/sensors used for thermal remote sensing, Surface temperature; Modeling of Bioclimate; Urban Green Areas and Effects on Climate; Relationship Between Climate Modeling and Planning; Rayman Applications in Climate Modeling; Biocomfort Satellite Platforms, Detection Sensors; Geometric, Radiometric and Spectral Corrections in Climatic Satellite Images; Image Analysis and Applications with ERDAS and ENVI.

UCS584 Introduction to Google Earth Engine 3+0 7.5

Uzaktan Algılama: Uzaktan algılama teknikleri, Verilerin seçilmesi, Verilerin indirilmesi; Google Earth Engine: Google Earth Engine teknikleri, Veri tabanları, Verilere ulaşım; Görüntü işleme: Görüntü okuma, Görüntü işleme, Görüntü kaydetme; Coğrafi Bilgi Sistemleri: Vektör dosyası okuma, Vektör veriler ile çalışma; Görüntü sınıflandırma: Sınıflandırma

teknikleri, Sınıflandırma, Örnek toplama, Doğruluk analizi; Görüntü Kullanımı: Zamansal değişimin belirlenmesi, Çevresel olayların izlenmesi, Afetlerin izlenmesi.

UCS586 Remote Sensing and Geographical Information System Applic. in Urban Climate Res. 3+0 7.5

Conceptual Fundamentals: Urban ecology, Environmental effects of urban development; Urban Development and Climate Relationship; Urban Climate; The Relationship Between Urban Climate and Planning; Urban Climate and Design Relationship; Relationship Between Urban Climate and GIS; Urban Heat Islands; Spatial Analysis of Urban Heat Islands: Air, Surface Temperature; Urban Climate and Air Pollution; Spatial Analysis of Air Pollution; Climate Sensitive Planning and Design; Using Information Technologies in Climate Sensitive Planning and Design.

UCS588 Machine Learning in Geographic Information Systems and Remote Sensing 3+0 7.5

Artificial Intelligence and Machine Learning in Geographic Information Systems and Remote Sensing; Fundamentals of Artificial Intelligence and Machine Learning; Learning Approaches: Supervised learning, Unsupervised learning, Semi-supervised learning; Machine Learning Algorithms in Geographic Information Systems and Remote Sensing; Applications of Machine Learning in Geographic Information Systems; Applications of Machine Learning in Remote Sensing; Future Directions.

UCS592 Seminar 3+0 7.5

UCS594 National Geographic Information System Data Themes and Institutional Applications 3+0 7.5

Turkish National Geographic Information System: Fundamental Concepts, Historical background; Hierarchical organization; National Geographic Data Themes and Turkish National Geographic Information Description Documents: Development process, Contributing institutions, Data theme responsibility matrix; Control and Monitoring Activities; Data Harmonization and Integration Activities.

UCS599 Term Project 3+0 0.0

UCS601 Use of GIS in Earth Sciences 3+0 7.5
Fundementals of positional data models, Applications of positional data models, positional data structures, positional data input, display of positional data, inquiry of positional data, transformation of positional data, applications of positional data transformation, tools needed for single map analysis, tools needed for map pairs analysis, tools needed for multi-maps analysis.

UCS602 Earth Systems 3+0 7.5
Global changes, energy equilibrium and greenhouse effect, atmospheric circulation system, circulation in oceans, modeling of atmosphere-ocean systems, plate tectonics, carbon cycle, ecosystems and biodiversity, effect of life on atmosphere: increase in oxygen and ozone, long period climate changes, paleobiodiversity, glaciations in Pleistocene, short period climate changes, global warming, ozone layer, human effect on biodiversity, climatologic stability in Earth and Earthlike planets.

UCS603 Advanced Photogeology 3+0 7.5
Stereoscopy, stereoscopic vision, stereoscopes, radial displacement concept, air photographs, types of air photographs, informations printed on aerial photographs, taking areal photographs, handling of areal photographs, photogeological

symbols and abbereviation, photointerpretation in geology, fundementals of photointerpretation, eseential interprettaion elements in photointerpretation, application of photointerpretation to geology, structural analysis, lithologic interpretation.

UCS604 Environmental Hydrogeology 3+0 7.5

Introduction to water quality, characterization of water bodies, hydrodynamic features, physico-chemical properties, biological characteristics, definition of water quality, water uses and human impact on water quality, pollutant sources and pathways, temporal and spatial variations of water quality,hydrological characteristics, rivers, major water quality issues in rivers, waste storage, geologicl aspects for assesment, clean up and siting of waste disposal sites, , sampling design, environmental impacts related to hydrogeological systems, environmental impacts on water resource systems..

UCS606 Hydraulics in Porous Media 3+0 7.5

Properties of fluids,statics of fluid, dynamics of fluid, general properties of porous media, porous environments, determination of porosity, hydrostatics of porous media, hydrodynamics of porous media, Darcy's law, aquifer types, hydrogeologic units, hydrological properties of hydrogeological units, groundwater currents, groundwater current equations, solution to current equation.

UCS607 Advanced Technology Supported Archaeological and Architectural Documentation 3+0 7.5

Concept of documentation, architectural documentation, archaeological documentation, advanced technology means, close picture photogrammetry, single picture evaluation, stereo photogrammetry, application of laser scanning, orthophoto production, evaluation.

UCS608 Multiple Criteria Stable Support System Applications in Disaster Management 3+0 7.5

Geographic data, information and decision making, functions of geographic information systems, geographic information systems and decision support, introduction to multi criteria decision support systems, producing criteria for disaster management, alternatives and restrictions, weighting of criteria, producing risk maps for disasters.

UCS609 Use of Geographic Information Systems in the Applications of Seismic Microzoning and Urban Transformation 3+0 7.5

Inner earth and geophysics, natural hazards and risks, earthquakes and effect of earthquakes on settlement areas, earthquake magnitude, building and operating local earthquake observation networks, earthquake risks and seismic hazard size, fundamentals of seismic microzoning, seismic data acquisition and evaluation, disaster risks and urban transformation, application of geographic information systems to urban microzoning studies.

UCS610 Application of High Speed Ground Penetrating Radar to Ballast and Subsoil Inspections of Runways, Highways and Railways 3+0 7.5

Recent advances in electronics and software development technologies provided high quality Ground Penetrating Radar (GPR) data with horizontal resolution of less than 5 centimeters and vertical resolution of less than 5 picoseconds at line speeds of more than 100 kilometers per hour. Contemporary increase in airline, highway and railway traffic imposes periodical ballast and subsoil inspections for local defects, deterioration, fouling and moisture accumulations. Modern GPR hardware (400 MHz and 1 GHz Horn Antennas, Doppler Radars, Digital Video Films, etc) and dedicated GPR processing, interpretation, visualization and analyzing software will be introduced.

UCS611 Use of Geographic Information Systems in the Planning of Earthquake Origin Risk/Damage Mitigation 3+0 7.5

Earthquakes, earthquake effects in local soil conditions, fundamental principles of disaster management, damage mitigation essentials, hazard analysis, strategies of hazard minimization, application of geographic information systems in hazard mitigation planning.

UCS612 Modern Approaches to the City Planning 3+0 7.5

The birth of the first civilizations and urbanism, as the Greek and Roman, medieval period, the understanding of cities and planning; medieval Islamic cities, the Renaissance understanding of the planning period, the industrial revolution, cities and other effects; ideal cities, working cities, planned industrial cities, urbanism and planning in the west of the modern and the development of post-modern era and the historical development of the conceptual roots in the process of urbanization today and the future by examining the effects of urbanization and the dynamics of the contemporary features of urbanization in different economic strings of urbanization and

UCS613 Urban Conservation-Restoration 3+0 7.5

The protection of national and international scale in urban areas, renovation and restoration, basic concepts, scope and purpose; urban sustainability, urban conservation action, the principles of urban conservation, urban renewal, urban

development and change in the tissues, the types of renovation, tissue renewal areas, the areas of urban renewal implementation issues, historical examples of application areas, urban renewal, historic environment restoration

UCS614 Urban Regeneration 3+0 7.5

Urban life style, urban growth speed, urban social and physical infrastructure, urban change and regeneration process, social, economic and physical aspects of regeneration process, urban development process and regeneration of implementation examples in the external and internal scope of urban regeneration, historical formation and structure of urban space, social and demographic development change in urban space, urban economic development change, physical development change in urban space, formation of urban culture and effect of urban space, implementation examples in country and the world.

UCS615 Resource Inventory and Analysis 3+0 7.5

Definitions of Basic Concepts: Resource, Inventory, Analysis, Resource inventory and analysis; Classification of Resources: Natural resources, Cultural resources; Importance and Basic Phases of Resource Inventory and Analysis; Equipment and Methods of Resource Inventory and Analysis; Simple and Detailed Survey Works for Natural and Cultural Resources: Topography, Hydrology, Geology, Climate, Soil, Flora, Fauna, Cultural values, Social values, Economical values; Capacity and Suitability Analysis.

UCS616 Physical Principles of Energy and Matter Interactions in Remote Sensing 3+0 7.5

Structure of Atom and Molecules; Transfer of Energy Mechanisms: Ionization, Excitation, Bremsstrahlung; Direct Ionizing Radiation; Indirect Ionizing Radiation; Quantum Structure of Electromagnetic Energy, Gamma absorption, Photoelectric effect, Compton scattering, Pair production; Neutron Interactions: Neutron reactions, Elastic and inelastic scattering, Reactions in biological systems; Structure of Earth Atmosphere; Energy Interaction in the Atmosphere: Scattering, Absorption; Interaction of Energy with Components of Earth Surface: Spectral reflectance of vegetation, soil and water.

UCS617 Special Subject at Remote Sensing 3+0 7.5

Introduction of Remote Sensing; Fundamentals of Remote Sensing; Sensing Systems and Platforms in Remote Sensing; Thermal Remote Sensing; Thermal Images and Their Interpretation; Thermal Remote Sensing Platforms and Their Application Areas; Thermal Remote Sensing Application Examples; Microwave Remote Sensing; Microwave Remote Sensing Systems; Radar Sensing Systems; Microwave Image Features and Their Interpretation; Microwave Remote Sensing Application Areas; Microwave Remote Sensing Application Areas.

UCS618 Network Analysis in Geographic Information Systems 3+0 7.5

Definitions of Terms Used in Network Analysis; Similarities and Differences Between Geometric Network and Network Dataset; Network Dataset Features; Build Network; Make Route Layer; Make Service Area Layer; Directions in Network Dataset; Make Closest Facility Layer; Make Location and Allocation Layer; Make Origin-Destination Cost Matrix; Solving Network; Turn Features and Tables.

UCS619 Spatial Hydrology 3+0 7.5

Hydrologic Modeling with GIS: History of hydrologic modeling, Role of GIS, Hidrologic modelling; Integration of Remote Sensing and GIS: Land use/land cover classification, Precipitation, Soil moisture, Evapotranspiration, Groundwater, Water quality, Runoff; Hiylogic Data: Data sources, Data input; Digital Terrain Model: Slope- aspect, Watershed, Drainage network; Modeling: Distributed modeling, Lumped modeling; GIS in Groundwater Hydrology: Groundwater data, Conceptual model development, Finite difference method, Display of the results.

UCS620 Remote Sensing and Geographic Information Systems Applications for Mine Reclamation 3+0 7.5

Definitions of Terms Used in Mine Reclamation; Time Span of Mine Closure; Mine Closure Plan; Mine Closure Procedures; Environmental and Social Impacts; Mine Reclamation Planning and Management; Laws and Regulations; Mine Reclamation Techniques; Geographic Information Techniques in Mine Closure; Cost of Mine Reclamation; Monitoring and Control of Nature Destruction in Mining with Remote Sensing and Geographic Information Systems.

UCS622 Basic Programming and Geometric Problems 3+0 7.5

Introduction, Data structures, Geometric data structures and standards; Algorithms, Flow Diagrams; Operations; Comparison Operations; Loop Structures; Basic I/O Operations; Methods, Arrays, Solution of basic geometric problems: Field Calculation, Distance calculation, Distance between point and line, 2D linear coordinate systems, Calculating nearest point, Intersection.

UCS624 Airborne Laser Scanning (LIDAR) Systems 3+0 7.5

Introduction; Airborne Laser Scanning Technology and Functions; Physical Basics of Laser Beams; Full Waveform Principles; LIDAR Data and Their Accuracy; Data Processing; Data Adjustment; Data Filtering and Point Classification;

Commercial Software and Hardware Systems; Application Examples; Quality Control of Laser Data; Advantages and Disadvantages of LIDAR Systems; Project.

UCS626 Logistics Optimization 3+0 7.5

Fundemantal Definitions, Operations, Operations research; Modeling in Operations Research, Problems determining and problem solving, Logistics and logistics systems, Logistics operations, Logistics network design, Site selection, Route problems, Route optimization; Multi-Criteria Decision Making Systems; Demand Forecasting and Management, Information technologies in logistic management, Software solutions for logistics, Case studies for logistics optimization.

UCS628 National Standards, Legislations and Public Applications 3+0 7.5

Basic Definitions and Concepts, European Union countries status, Inspire directives, Current institutional structure of geographic information systems in our country, Spatial data producing public institutions, National spatial data standards, TUCBS, National legislation in cadastral studies, Mapping, Cartography, Planning and geographical information technologies, Infrastructure facilities, National studies, public applications, Future sectoral approaches.

UCS630 Geographical Information Applications for Water Resources Planning 3+0 7.5

Digital Elevation Model (TIN and GRID) Concepts; Drainage Basin Extraction and Determination of Properties; Various Spatial and Three-dimensional Analysis: Soil and Land Use Mapping, Point-to-area distribution (rain / snow / soil moisture / dirt etc.), Site selection and dimisioning for water structures; Disaster (flood, landslide, etc..) Risk Mapping; Geographic Information Systems Applications on the Field of Water Resources.

UCS632 Government Projects and Spatial Relations in Turkey 3+0 7.5

E-Government Structure: E-government elements, The application purpose and the factors which the transforma-tion, The benefits of the application, History, Spatial e-government practices in the world; E-Government and E-Transformation Process Adaptation Studies in Turkey: Information society strategy action plan, Integration stan-dards, Data sharing standards, IT and security standards; Spatial Data Infrastructure and E-Government: TUCBS, Spatial e-government projects sample and applications.

UCS634 Property Law and Introduction to Land Survey Applications 3+0 7.5

Introduction: The basic concepts of law, Real and personal rights, Property law and possession, The turkish civil code, People law, Family law, Inheritance law, Real law, The right to property, Real property; Title Deeds and Land Registry: Land registry in Turkey, Principles and elements of the land registry, Transactions in the land registry, Land registry organization; Cadastre: Definitions and concepts, Definitions used in the cadastre, Land ownership relations, Cadastre types, Cadastral functions implemented in Tur-key, Cadastral works in Turkey.

UCS635 Satellite Image Processing 3+0 7.5

Basic Concepts: Platforms and sensors, Basic image principles, Pixel, Band, Resolution; Earth Observation Satellites: History; Satellite Image Processing Steps: Image registration, Rectification, Ortho-rectification, Image download and pre-processing, Image filters, Image pan-sharpening, Radiometric and atmospheric correction; Image Analysis from Satellite Image; Image classification, Accuracy assessment, Digital elevation model analysis; Satellite Image Interpretation: Image interpretation techniques; Applications: Building extraction, Vegetation cover detection, Thermal remote sensing images.

UCS636 Project Management in Geographic Information Systems 3+0 7.5

Introduction: What is project, What is project management; Project Life Cycle and Organization: The features of the project life cycle, Project phases, Stakeholders; Project Management Processes in The GIS Project: Orientation process groups, Starting processes, Planning processes, Execution processes, Monitoring and control processes; Project Integration Management: The development of the project management plan, The realization of the integrated change control; The Project Scope Management; Project Time Management; Project Cost Management; Project Quality Management; Managing The Project Team; Project Risk Management; Project Procurement Management.

UCS637 Remote Sensing and Geographic Information Systems Studio I 6+4 7.5

City Information Systems; Logistics Management; GIS and Remote Sensing Utilization in Urbanisation Applications; Agricultural and Forestry Applications, GIS and RS Utilization in Conservation Applications, GIS Use in Cultural Heritage Inventory; RS and GIS Utilization in Physical Planning Applications; GIS and RS Utlization in Watershed Management, GIS and RS Utilization in Mining Applications; GIS and RS Utilization in EIA and SEA Processes.

UCS638 Remote Sensing and Geographic Information Systems Studio II 6+4 7.5

Geographic Information Systems and Remote Sensing Utilization in Disaster Management, Geographic Information Systems and Remote Sensing Utilization in Earth Sciences, Change Analysis, Geographic Information Systems and Remote Sensing Utilization in Defence Industry and National Security, Geographic Information Systems Applications in Environmental Management, Geographic Information Systems and Remote Sensing Applications in Environmental Engineering, Geographic Information Systems Studio and Archaeological Sites Management, Automated Mapping and Facility Management, Geographic Information Systems Utilization in Tourism Inventory Studies.

UCS639 Remote Sensing with Google Earth Engine Remote Sensing 3+0 7.5

Introduction of Remote Sensing Techniques; Data Selection; Data Collection; Google Earth Engine: Introduction of google earth engine techniques; Database İntroduction; Data Access; Image Processing: Image reading; Image Processing; Image Export; Geo-Information Systems; Opening Vector File; Working with Vector Data; Image Classification: Classification methods; Classification; Sample Collecting; Accuracy Analysis; Image Use: Multi-temporal changes; Monitoring Environmental Events; Disaster Monitoring.

UCS640 Gis Applications in Agriculture 3+0 7.5

Basic Concepts: Agriculture, Agricultural activities, Natural factors affecting agriculture, Human factors affecting agriculture, Agriculture and technology, Historical development of agriculture: The first agriculture revolution, The second agriculture revolution, The third agriculture revolution, Conventional agriculture, Ecological agriculture, Agricultural policies, Sustainable food and nutrition, Agricultural planning, agricultural production mapping, Agricultural workforce mapping, Agricultural population mapping, agricultural needs mapping, Agricultural product market analysis mapping, Determination of optimum agricultural pattern.

UCS641 Deep learning in Remote Sensing 3+0 7.5

Fundamentals of machine learning and deep learning; Models and hyperparameters in deep learning; Fundamentals of computer programming with Python programming language; Image classification with deep learning; Image classification application with deep learning; Object detection with deep learning; Object detection application in remote sensing images with deep learning; Pixel-based classification with deep learning; Pixel-based classification application in remote sensing images with deep learning; Deep Learning Project.

UCS642 Machine Learning Applications in Geographic Information Systems and Remote Sensing 3+0 7.5

Geospatial Data Science; Introduction to Machine Learning: Data modeling, Pattern identification, Decision-making; Learning Approaches in Machine Learning: Supervised learning, Unsupervised learning, Semi-supervised learning, Reinforcement learning; Supervised Machine Learning: Classification, Regression, Prediction; Unsupervised Machine Learning: Clustering, Dimensionality reduction, Feature extraction; Decision Trees and Random Forests; Support Vector Machines; Bayesian Networks; Genetic Algorithms; Hidden Markov Models; Artificial Neural Networks; Performance Analysis; Machine ApplicationLearning in GIS, Machine Learning Applications in RS.

UCS643 Advanced Geographic Information System Applications in Urban Climate Research 3+0 7.5

Conceptual Fundamentals: Urban ecology, Urban development and climate relationship, Urban climate; Urban Climate and Planning Relation; Urban Climate and Design Relation; Urban Climate and GIS Relation; Urban Climate Maps; Integration of Climate Change into Urban Climate Maps and Spatial Planning; Urban Heat Islands; Spatial Analysis of Urban Heat Islands: Air, Surface temperature; Local Climate Zones; Spatial and Statistical Studies on Integration of Local Climate Zones into Planning and Design; Urban Climate and Air Pollution; Spatial Analysis of Air Pollution; Thermal Comfort; Spatial Analysis for Thermal Comfort.

UCS692 Seminar 3+0 7.5

UCS701	**Research in Area of Specialization**	**3+0**	**4.5**
UCS702	**Research in Area of Specialization**	**3+0**	**4.5**
UCS790	**Thesis**	**0+1**	**30.0**
UCS890	**Thesis**	**0+1**	**30.0**
UCS890-0	**Thesis (Thesis Proposal)**	**0+1**	**30.0**
UCS901	**Research in Area of Specialization**	**5+0**	**7.5**
UCS902	**Research in Area of Specialization**	**5+0**	**7.5**
UÇV701	**Research in Area of Specialization**	**3+0**	**4.5**
UÇV702	**Research in Area of Specialization**	**3+0**	**4.5**
UÇV901	**Research in Area of Specialization**	**5+0**	**7.5**
UÇV902	**Research in Area of Specialization**	**5+0**	**7.5**
UEB701	**Research in Area of Specialization**	**3+0**	**4.5**
UEB702	**Research in Area of Specialization**	**3+0**	**4.5**
UEB902	**Research in Area of Specialization**	**5+0**	**7.5**
UEE701 (Eng)	**Research in Area of Specialization**	**3+0**	**4.5**
UEE702 (Eng)	**Research in Area of Specialization**	**3+0**	**4.5**
UEE901 (Eng)	**Research in Area of Specialization**	**5+0**	**7.5**

UEE902 (Eng)	**Research in Area of Specialization**	**5+0**	**7.5**
UEN701	**Research in Area of Specialization**	**3+0**	**4.5**
UEN702	**Research in Area of Specialization**	**3+0**	**4.5**
UEN901	**Research in Area of Specialization**	**5+0**	**7.5**
UEN902	**Research in Area of Specialization**	**5+0**	**7.5**
UET701	**Research in Area of Specialization**	**3+0**	**4.5**
UET702	**Research in Area of Specialization**	**3+0**	**4.5**
UFZ701	**Research in Area of Specialization**	**3+0**	**4.5**
UFZ702	**Research in Area of Specialization**	**3+0**	**4.5**
UFZ901	**Research in Area of Specialization**	**5+0**	**7.5**
UFZ902	**Research in Area of Specialization**	**5+0**	**7.5**
UGM501	**Advanced Human Factors in Aviation**	**3+0**	**7.5**

UGM510 Failure Analysis of Aircraft Structures 3+0 7.5

Introduction; Definitions, Common causes of failures, Deficiency in design, Manufacturing defects, Deficiency in inspection and maintenance, Abnormal conditions, envi-ronmental effects, Failure analysis methodology and sta-ges, Examination methods of failure analysis; Nondestruc-tive inspection, Destructive inspection, Characterization, Special techniques, Failure analysis of aircraft structures; Fatigue, Creep, Corrosion, Fracture, Fretting, Wear, Dis-tortion failures, Case studies of failures.

UGM511 Mathematical Programming and Aviation Applications 3+0 7.5

Linear Programming: Basic terms, Geometric solution; Linear Algebra: Convex analysis, Polyhedral sets; The Simplex Method: Extreme points and optimality; Mathematical Modeling: Coding of linear programming problems in LINDO and analysis of computer solutions; Integer Programming Models; Aviation Applications: Labor force planning in the airport, Aircraft route planning, Aircraft maintenance planning, Airline crew scheduling.

UGM512 Electric - Hybrid Propulsion Systems and Aviation Applications 3+0 7.5

Introduction; Electric Vehicles; Types of Electric Vehicles: Battery Electric Vehicles, Plug-in Electric Vehicles, Fuel Cell Electric Vehicles; Hybrid Propulsion Systems and Types: Serial Hybrid Vehicles, Parallel Hybrid Vehicles, Serial-Parallel Hybrid Vehicles, Advanced Hybrid Vehicles; Comparison of Hybrid Electric Vehicles with Other Electric Vehicles; Existing Electric and Hybrid Propulsion Vehicle Examples in Aviation.

UGM513 Propeller and Windmill Aerodynamics 3+0 7.5

Introduction, Propeller theories: Momentum theory, Blade element theory, Power losses, Blade angle, Blade geometry, Blade loading, Blade shank geometry, Compressibility effects, Propeller performance, Ducted propellers, Propeller noise, Propeller selection, Propeller design: Betz minimum energy loss condition, Glauert, Larrabee, Adkins and Liebeck propeller design methods, Propeller analysis, Wind turbine technology, Aerodynamic design of wind turbines, Aerodynamic analysis of wind turbines.

UGM515 Advanced Manufacturing and Assembly Technology for Aircraft Materials 3+0 7.5

Contents: Introduction of aircraft materials, Assembly; Aluminum; Magnesium and Beryllium; Titanium; High Strength Steels; Superalloys; Polymer Matrix Composites; Adhesive Bonding and Integrally Cocured Structure; Metal Matrix Composites; Ceramic Matrix Composites; Structural Assembly: Framing, Shimming, Hole drilling, Fastener selection and installation, Sealing, Painting.

UGM517 Sustainability Analysis at Airports 3+0 7.5

Introduction: Airport organization structure, Airport air-and-land-side areas, Sustainability management models; Standards: National and international standards (ISO 50001, ISO 14001), Green airport certification; Sustainability: Economic sustainability, Environmental sustainability; Social sustainability; Economic Analysis: Estimation of investment, Principles of economic evaluation, Life cycle cost analysis; Energy Analysis: Determination of energy consumption and calculations, Modeling and analysis for process monitoring; Environmental Analysis: Determination of environmental impacts and damages, Life cycle assessment; Sustainability Analysis: Combination of method economically and environmentally, holistic life cycle analysis.

UGM519 Batteries and Battery Systems 3+0 7.5

Fundamentals: Introduction to Aircraft Electric Storage; Fundamentals of Aviation Battery and Electrochemistry; Aircraft Battery Architecture: Lead Acid Batteries, Li-Ion Batteries; Super Capacitors and Applications; Battery Systems Integration; Battery Applications: Network Connected Electric Storage, Aviation; Battery Modelling And Simulation; SOC Calculation; Future Electric Energy Storage Technologies; Second Life of Batteries and Recycling; Battery Standards and Tests; Battery Safety.

UGM521 Momentum and Heat Transfer 3+0 7.5

Introduction to Momentum Transfer; Systems and Control Volumes; Flow Models: Finite control volume, Infinitesimal fluid element; Basic Tools: The substantial derivative, The divergence of the velocity, The Reynolds transport theorem; Fundamental Governing Equations: Continuity equation, Momentum theorem, Energy equation; Angular Velocity; Stream Function; Circulation; Velocity Potential; Inviscid-Viscous Flow; Introduction to Heat Transfer; Conduction: Differential equations of heat transfer, Steady-Unsteady conduction; Convective Heat Transfer: Parameters, Dimension analysis; Radiation Heat Transfer: Emissivity, Absorptivity, Black bodies, Radiation from gases.

UGM523 Physical Ergonomics in Aviation 3+0 7.5

Introduction to Ergonomics; Human Anatomy; Anthropometry; Physical Ergonomics; Work Systems and Classifications of Work; Model of Workload-Strain; Human Performance Capacity; Static and Dynamic Work; Human Energy Requirements and Continuous Performance Limit; Heart Rate in Dynamic and Static Work; Fatigue and Work Breaks in Workplace; Effects of Environmental Factors; Displays and Control Elements; Ergonomic Principles in the Design of Work Tools and Instruments; Aircraft Accidents and Literature Studies on Physical Ergonomics in Aviation.

UGM592 Seminar 3+0 7.5

UGM601 Environmental Impact of Commercial Aircraft 3+0 7.5

Fundamental Combustion Thermodynamics; Emission Types: NOX, HC and CO; Emission Mechanisms; Emission Regulations; Emission Inventory Investigations: ICAO, SAGE, AERO2K, DLR; Actual Emission Tests; Emission Abatement Techniques in Engines; Emission Analyses with Flight Data; Engine Power and Emissions; Effect of Flight Phase on Emissions: Cruise, Climb, Descent; Emission Estimations Based on Airport; Emissions and Air Traffic Management.

UGM603 Advanced Heat Transfer Calculations in Aviation 3+0 7.5

Basics of Heat Transfer; Heat Conduction: Steady-state heat conduction, Concept of heat resistance, Determination of temperature distribution, Unsteady heat transfer, Lumped system analysis, Infinite and semi-infinite matters, Fundamentals of heat convection, Dimensionless numbers, Energy equation, Momentum equation, Mass equation, Forced convection, Forced external convection, Forced internal convection, Natural convection; Heat Transfer Analyses for Aviation Applications.

UGM605 Advanced Exergy Analysis in Aviation 3+0 7.5

Basic Concepts; Conventional Exergy; Exergoeconomic and Exergoenvironmental Analyses and Exergy Destruction: Definitions of the theoretical system and the unavoidable thermody-namic irreversibility, Endogenous and exogenous exergy destructions, Unavoidable and avoidable exergy destructions, Avoidable endogenous, avoidable exogenous, Unavoidable exogenous, unavoidable endogenous exergy destructions, Mexogenous exergy destructions, Application of advanced exergy analyses to exergoeconomic and exergoenvironmental meth-ods in aviation.

UGM606 Fuel Flow Rate Prediction Models and Optimization for Commercial Aircraft 3+0 7.5

Fundamental equations of aircraft motion; Aircraft performance parameters; Study of climb, cruise, and descent phases; Jet engines; Thrust; Specific fuel consumption; Fuel flow rate prediction models in the current literature; Logarithmic derivatives of aircraft performance parameters; Classical optimization by Lagrange multipliers; Non-conventional optimization methods; Thrust modelling; Fuel flow rate prediction using genetic algorithms; Modelling of fuel flow rate by the use of artificial neural networks; Fuel flow rate prediction using particle swarm optimization; Fuel flow rate prediction via cuckoo search algorithm.

UGM607 Aircraft Performance Modelling and Parametric Optimization 3+0 7.5

Fundamental Equations of Motion; Aircraft Performance Parameters; Jet Engines; Thrust; Logarithmic Derivatives of Aircraft Performance Parameters; Classical Optimization by Lagrange Multipliers; Genetic Algorithms and Metaheuristic Optimization; Thrust Modelling; Climb and Descent Trajectory Prediction Models; Climb and Descent Airspeed Modelling; Climb and Descent Altitude Modelling; Rate of Climb and Descent Modelling; Calculation of Time to Climb and Descent; Cruise Range; Cruise Range for Various Flight Strategies; Modelling of Cruise Range by Using Metaheuristic Methods; Specific Fuel Consumption; Modelling of Fuel Flow Rate by Using Metaheuristic Methods.

UGM610 Thermoeconomic and Thermoenvironmental Optimization in Aviation 3+0 7.5

Thermal system design, Life-cycle design, Economic and environmental studies in aviation; Thermodynamic Analy-sis: Energy and exergy analysis, Heat transfer, modeling, and design analysis; Economic Analysis: Estimation of investment, Principles of economic evaluation; Environ-mental Analysis: Determination of environmental impacts and damages; Thermoeconomic Analysis and Evaluation; Thermoenvironmental Analysis and Evaluation; Aviation Application of Thermoeconomic and Thermoenvironmen-tal Analysis: Piston-prop engines, Gas turbine engines; Optimization: Determination of optimum points.

UGM612 Sustainable Aviation Fuels 3+0 7.5

Conventional Jet Fuels and Alternative Fuels in Aviation; Basic Characteristics: Specific energy, Energy density, Density, Viscosity; Drop-in and Neat Using; Synthetic Paraffinic Kerosene Fuels: Coal-to-liquid, Gas-to-liquid, Biomass-to-liquid; Hydroprocessed Renewable Jet Fuels: Jatropha, Camelina, Algae; Aviation Fuel Standards; Test Flights; Airport Infrastructure Compatibilities; Gaseous and PM Emissions; Range and Payload Effects; Alternative Fuel Targets.

UGM614 Finite Volume Method 3+0 7.5

Introduction; Conservation Equations for Fluid Flow: Continuity equation, Conservation of momentum equation and conservation of energy equation; Turbulence and Modelling; Fundamentals of Finite Volume Method (FVM); FVM for Diffusion Equation; FVM for Convection-Diffusion Equation; Solution Techniques for Steady Flow; Solution Techniques for Unsteady Flow; Solution of Linear Equations; Implementation of Boundary Conditions; Error Analysis; Engineering Application Examples of Finite Volume Method.

UGM692 Seminar 3+0 7.5

UGM790 Thesis 0+1 30.0

UGM890 Thesis 0+1 30.0

UGM890-0 Thesis (Thesis Proposal) 0+1 30.0

UHE701	**Research in Area of Specialization**	**3+0**	**4.5**
UHE702	**Research in Area of Specialization**	**3+0**	**4.5**
UHE901	**Research in Area of Specialization**	**5+0**	**7.5**
UHE902	**Research in Area of Specialization**	**5+0**	**7.5**
UHT701	**Research in Area of Specialization**	**3+0**	**4.5**
UHT702	**Research in Area of Specialization**	**3+0**	**4.5**
UHT901	**Reseach in Area of Specialization**	**5+0**	**7.5**
UHT902	**Reseach in Area of Specialization**	**5+0**	**7.5**
UİÇ701	**Research in Area of Specialization**	**3+0**	**4.5**
UİÇ702	**Research in Area of Specialization**	**3+0**	**4.5**
UİÇ901	**Research in Area of Specialization**	**5+0**	**7.5**
UİÇ902	**Research in Area of Specialization**	**5+0**	**7.5**
UİN701	**Research in Area of Specialization**	**3+0**	**4.5**
UİN702	**Research in Area of Specialization**	**3+0**	**4.5**
UİN901	**Research in Area of Specialization**	**5+0**	**7.5**
UİN902	**Research in Area of Specialization**	**5+0**	**7.5**
UİS701	**Research in Area of Specialization**	**3+0**	**4.5**

UİS702	**Research in Area of Specialization**	**3+0**	**4.5**
UİS901	**Research in Area of Specialization**	**5+0**	**7.5**
UİS902	**Research in Area of Specialization**	**5+0**	**7.5**
UİT701	**Research in Area of Specialization**	**3+0**	**4.5**
UİT701 (Eng)	**Research in Area of Specialization**	**3+0**	**4.5**
UİT702	**Research in Area of Specialization**	**3+0**	**4.5**
UİT702 (Eng)	**Research in Area of Specialization**	**3+0**	**4.5**
UİT901 (Eng)	**Research in Area of Specialization**	**5+0**	**7.5**
UİT902 (Eng)	**Research in Area of Specialization**	**5+0**	**7.5**
UKH701	**Research in Area of Specialization**	**3+0**	**4.5**
UKH702	**Research in Area of Specialization**	**3+0**	**4.5**
UKH901	**Research in Area of Specialization**	**5+0**	**7.5**
UKH902	**Research in Area of Specialization**	**5+0**	**7.5**
UKM701	**Research in Area of Specialization**	**3+0**	**4.5**
UKM702	**Research in Area of Specialization**	**3+0**	**4.5**
UKM901	**Research in Area of Specialization**	**5+0**	**7.5**
UKM902	**Research in Area of Specialization**	**5+0**	**7.5**

UMİ701	**Research in Area of Specialization**	**3+0**	**4.5**
UMİ702	**Research in Area of Specialization**	**3+0**	**4.5**
UMİ901	**Research in Area of Specialization**	**5+0**	**7.5**
UMİ902	**Research in Area of Specialization**	**5+0**	**7.5**
UMK701	**Research in Area of Specialization**	**3+0**	**4.5**
UMK702	**Research in Area of Specialization**	**3+0**	**4.5**
UMM701	**Research in Area of Specialization**	**3+0**	**4.5**
UMM702	**Research in Area of Specialization**	**3+0**	**4.5**
UMM901	**Research in Area of Specialization**	**5+0**	**7.5**
UMM902	**Research in Area of Specialization**	**5+0**	**7.5**
UMT701	**Research in Area of Specialization**	**3+0**	**4.5**
UMT702	**Research in Area of Specialization**	**3+0**	**4.5**
UMT901	**Research in Area of Specialization**	**5+0**	**7.5**
UMT902	**Research in Area of Specialization**	**5+0**	**7.5**
UPL701	**Research in Area of Specialization**	**3+0**	**4.5**
UPL702	**Research in Area of Specialization**	**3+0**	**4.5**
USH701	**Research in Area of Specialization**	**3+0**	**4.5**

USH702	**Research in Area of Specialization**	**3+0**	**4.5**
USH901	**Research in Area of Specialization**	**5+0**	**7.5**
USH902	**Research in Area of Specialization**	**5+0**	**7.5**
USİ701	**Research in Area of Specialization**	**3+0**	**4.5**
USİ702	**Research in Area of Specialization**	**3+0**	**4.5**
USİ901	**Research in Area of Specialization**	**5+0**	**7.5**
USİ902	**Research in Area of Specialization**	**5+0**	**7.5**
USM701	**Research in Area of Specialization**	**3+0**	**4.5**
USM702	**Research in Area of Specialization**	**3+0**	**4.5**
USM901	**Research in Area of Specialization**	**5+0**	**7.5**
USM902	**Research in Area of Specialization**	**5+0**	**7.5**
USY701	**Research in Area of Specialization**	**3+0**	**4.5**
USY702	**Research in Area of Specialization**	**3+0**	**4.5**
USY901	**Research in Area of Specialization**	**5+0**	**7.5**
USY902	**Research in Area of Specialization**	**5+0**	**7.5**
UUG701	**Research in Area of Specialization**	**3+0**	**4.5**
UUG702	**Research in Area of Specialization**	**3+0**	**4.5**

UUG901 Research in Area of Specialization 5+0 7.5

UUG902 Research in Area of Specialization 5+0 7.5

UYB701 Research in Area of Specialization 3+0 4.5

UYB702 Research in Area of Specialization 3+0 4.5

YBL501 Earth Sciences 3+0 7.5
Introduction to Earth Sciences, Information about the earth, Earths's surface, Earth's internal structure, Atmosphere, Minerals and rocks, Volcanic rocks, Sedimanter rocks, Metamorphic rocks, The earth's general properties, Formation of the universe, Geologic date, Rock cycle, Motion of tectonic plates that make up the earth, Soil formation, Environmental geology.

YBL502 Geotechnical Earthquake Engineering 3+0 7.5
Earthquakes, Mesurement and distrubution of earthquakes, Characterization of seismicity, Engineering models of strong motion, Attenuation relations, Seismic risk and hazard, Response spectra, Stress-strain and shear strength characteristics of soils under earthquake excitations, Liquefaction and counter measures, Site amplification and microzonation, Earthquake codes related to geotechnical design.

YBL503 Geophysical Methods in Civil and Environmental Engineering 3+0 7.5
Introduction to Geophysical Methods, Geophysical applications in civil engineering: Determination of Seismic P and S Wave Velocities, Seismic quality factor Q, Computation of static and dynamic soil parameters, Concept of bed-rock and seismic-basement, Geophysical applications in environmental engineering: Determination and Prospecting of Dump-sites, Implementation of seismic and ground penetrating radar techniques.

YBL504 Shallow Marine Geophysics 3+0 7.5
Comparison of Land and Marine Geophysical Methods and Instrumentation; High-resolution Seismic, Multibeam-echosounder and side-scan-sonar techniques in shallow marine geophysics, Implementation of gravity and magnetic methods in marine environment, Seafloor classification, Geotechnical studies in marine environment: Docks, Bridges, Tunnels, Cables, Pipes, Offshore oil platforms, Dredging, Search for industrial materials and mines.

YBL505 In-situ Testing and Evaluation 3+0 7.5
Borings and Soil Sampling; Standard Penetration Test (SPT); Cone Penetration Test (CPT); Plate Loading Test; In-situ Density Measurements; In-situ California Bearing Ratio Test (CBR); Pressuremeter; Dilatometer Tests; Field Shear Vane Test; In-situ Permeabilty Testing; Groundwater Pressure Measurements; Dynamic Soil Properties based on in-situ Measurements; Microtremor Measurements in Geotechnical Engineering; In-situ Stress and Deformation Measurements.

YBL506 Geosynthetics 3+0 7.5
Introduction to Geosyntheticsi, The history and development of geosynthetics, Standarts and selection of geosynthetics, Geosyntetics- soil interaction, Geometrical, Physico-mechanical chemical and hydraulic properties of geosyntethetics, Production technology of geosynthetics, Project realization, Soil reinforcement, Drainage, Bank and bed protection, Roads and railways, Lining system.

YBL507 Experimental Soil Mechanics 3+0 7.5
Introduction to Experimental Soil Mechanics, Information about soil samples, Contents of laboratory report, Determination of water content of soil, atterberg limits of soils, Particle size analysis-mechanical method and hydrometer method, Specific gravity of soils, Relative density determination, compaction test, California bearing ratio (CBR) test, Coefficient of permeability, Consolidation test, Unconfined compression test, Triaxial test, Direct shear test.

YBL508 Theoritical Soil Mechanics and Soil Models 3+0 7.5

Rock Cycle and The Origin of Soil, Soil composition, Classification and identification of soil, flow of water in soil, Capilary rise in soils, Engineering properties of soil, Effective stress concept, Stress-strain behaviour of soils, Compressibility of soil, Yield criterion of soils, Some theories of failure, Classification.

YBL509 Engineering Properties of Soils 3+0 7.5

Evaluation of Site Conditions, Sampling of soil, Classification of soil and index properties, Composition of soil, Consolidation, Theory of consolidation, Consolidation and settlements of soil, Flow of water in soils, Permeability concept, Compaction of soils, Stress and strain properties of soil stress and strain behavior of soils, Shear strength of soils, Shear strength properties of soils.

YBL510 Groundwater Hydraulics 3+0 7.5

Definitions of Basic Concepts, Geological and hydrogeological classification of groundwater reservoirs; Aquifer Types, Unconfined, Confined, Leaky, Pearch; Well Types, Small diameter, Large diameter, Deep, Shallow, Drilling, Completely and partially penetrations, Non-penetration; Groundwater Flow Types, Lamınar, Turbulance, Steady, Unsteady, Compressible flows; Aquifer Parameters, Hydraulic conductivity, Specific yield, Specific retention, Storage coeffixient, Transmissivity; Darcy Law, Hydraulic load, Piezometers, Well losses.

YBL511 Geological and Hydro-meteorological Hazard Analysis 3+0 7.5

Concepts Related to Natural Hazards; Fundamental Mechanism of Earthquakes; Seismic Haz-ard Analysis; Fundamental Mechanisms of Landslides and Erosion; Landslide Hazard Analy-sis; Erosion Hazard Analysis; Applications of Landslide Hazard Analysis and Erosion Hazard Analysis; Flood Hazard Analysis; Application of Flood Hazard Analysis; Multi-hazard As-sessments.

YBL512 Earth Systems 3+0 7.5

Global Changes, Energy equilibrium and greenhouse effect, Atmospheric circulation system, Circulation in oceans, Modeling of atmosphere-ocean systems, Plate tectonics, Carbon cycle, Ecosystems and biodiversity, Effect of life on atmosphere: Increase in Oxygen and Ozone, Long period climate changes, Paleobiodiversity, Glaciations in pleistocene, Short period climate changes, Global warming, Ozone layer, Human effect on biodiversity, Climatologic stability in earth and earthlike planets.

YBL513 Project Preparation and Management 3+0 7.5

Project Cycle Management; Logical Framework; Needs Analysis; Problem Analysis and Stra-tegic Planning Techniques: Stakeholder analysis, Problem analysis, Analysis of objectives, Analysis of Strategies, Communication strategies; Indicators of Success; Operational Plan-ning; Quality Factors; Project Implementation; Project Monitoring and Evaluation; Designing a Monitoring System; Project Reporting.

YBL514 Sustainability of Cities 3+0 7.5

City, Urban geography, origins of city, urban geographic views, urbanization, features and concepts; Physical environment and urban population; Spatial regulation patterns of city and urban land use models; regions depending on cities, cities domains; f classification of cities;Horizontal and vertical developments of city, geographical approach of urbanization problems: Squatters and earthquakes, etc..; Urban transportation, Management of urban resource, Urban renewal, Urban conservation; Urban tourism; Quality of urban life.

YBL516 Geomorphology 3+0 7.5

Definition and relationship with other disciplines of geomorphology; Structural geomorphology; Fluvial geomorphology; Karst morphology; Coastal morphology; Geomorphology of arid and semi-arid regions Volcano morphology, Glacial morphology; Main geomorphological features of Turkey; Geomorphology applications: Paleogeographic evolution of the archaeological site, erosion detection, identifying landslide risk areas, identifying the flood areas, road constructions.

YBL518 Soft Computing and Data Mining in Earth Sciences 3+0 7.5

Introduction; Soft Computing and Data Mining; Fuzzy Set Theory; Fuzzy Set Theory and Earth Sciences literature review; Application of Fuzzy Set in Hydrology and Hy-drogeology; Application of Fuzzy Set in Landslides and Earthquakes; Artificial Neural Networks; Artificial Neural Networks and Earth Sciences literature review; Application of Artificial Neural Networks in Hydrology and Hydroge-ology; Application of Artificial Neural Networks in Land-slides and Earthquakes; Hybrid Systems; Hybrid Systems and Earth Sciences literature review.

YBL519 Introduction to Data Science with Python for Earth Sciences 3+0 7.5

Introduction: Python Programming Basics, Learn to use earth science and other data in Python; Data Science: machine learning algorithms, data processing, statistical research, Python for data analysis: Introduction to Numpy, Introduction to

Pandas, Introduction to Matplotlib, Indexing, Operations, Exercises; Linear Regression Models; Nonlinear Regression Models; Classification; Clustering; Big Data Analytics.

YBL520 Spectral Analysis of Earthquake Waves 3+0 7.5

Seismology: Structure of the earth's interior, Seismic waves, Travel times and distance; Dispersion: Normal Dispersion; The dynamic and structural properties of the earth and faulting mechanisms; Seismic Network: General properties of recording systems, Structure of seismic network and management, National and international seismic networks; Strong Ground Motion; Microtremor and Application of Microtremor; Spectral Analysis.

YBL521 Geotechnical Earthquake Engineering 3+0 7.5

Basic Concepts: Seismicity, Magnitude and Intensity of Earthquake, Plate Tectonics, Fault Types; Dynamic Soil Properties: Stress-Strain Behavior of cyclically loaded soils and strength properties, Measurement of dynamic soil properties, Evaluation of the effect of local soil properties on earthquake damages; Ground Motions: Amplitude, frequency and duration parameters of ground motion, Attenuation relationships; Seismic Ground Response Analysis: Analysis methods, Response Spectra, Site Amplification, Design Spectra and Turkish Earthquake Code; Soil Liquefaction: Liquefaction analysis, Post liquefaction ground deformations.

YBL522 Numerical Methods in Geotechnical Engineering 3+0 7.5

Review of Analytical, Numerical and empirical Methods; Application of Numerical Methods in Geotechnical Engineering Topics; Definition of Geotechnical Problems; Preliminary Studies and Design Consideration in Geotechnic; FEM Numerical Methods: Plaxis; Introduction to Plaxis; Exercises and Case Studies Based on Plaxis Software; Solving Geotechnical Problems by Plaxis Program; An Underground Project Design by Using Plaxis Program.

YBL523 Active Faults of Turkey and Their Earthquake Potential 3+0 7.5

Active Fault Definition and Classification of: Earthquake surface rupture, Holocene fault, Quaternary fault, Probable Quaternary fault or lineament; Active Fault Map of Turkey: Source of data, Method, Principles of mapping; Active Faults in Turkey and its Vicinity: Daed Sea Fault Zone, Aegean Arc System, Cyprus Arc System, Causasian thrust belt, Pontid escarpment; Distribution of Turkey's Active Faults, General Characteristics and Their Earthquake Potential: North Anatolian Fault Zone, East Anatolian Fault Zone, South East Anatolian Thrust Zone, Active faults of East Anatolian Compressional Province, Active faults of Central Anatolia.

YBL524 Introduction to Earthquake Engineering 3+0 7.5

Engineering Seismology: Plate tectonics, Earthquake source, Earthquake parameters, Tsunamis; Earthquake Ground Motion: Instrumentation, Earthquake ground motion parameters, Ground motion prediction equations, Simulation of ground motion, Effect of local site conditions on earthquake ground motion; Earthquake Early Warning and Rapid Response Systems: Analysis methods; Seismic Hazard Analysis: Deterministic and Probabilistic hazard analysis, Seismic hazard deaggregation; Response of Structures to Earthquake Ground Motion: Single and multi of-freedom systems, Earthquake design spectrum; Seismic Design Codes: Turkish seismic design code.

YBL525 Engineering Geology and Construction in Earth Sciences 3+0 7.5

Sub-Division of Applied Geology Engineering Geology and Construction Relations; The Importance of Engineering Geology in Developing Societies Due to Increasing Energy, Transportation and Settlement Requirements; Engineering Geology in Underground and Surface Excavations, Rock and Ground Problems in Engineering Projects Regarding Construction of Building and Building Type Structures; Basic Applications During and After Construction in Geotechnical Field Investigations in Bridges, Tunnels, Dams and Highways. Importance of Engineering Geology in Earthquake Resistant Design.

YBL526 Hydrogeochemistry 3+0 7.5

Introduction: Groundwater quality, Sampling of groundwater, Chemical analysis of groundwater; The Hydrological Cycle: The composition of rainwater, Stable isotopes in rain, Overall controls on water quality; Flow and Transport: Flow in the unsaturated zone, Flow in the saturated zone, dating of groundwater, Retardation, Diffusion, Dispersion; Minerals: Equilibria and the solubility of minerals, Kinetics of geochemical processes: Carbonates and Carbon Dioxide: Carbonate minerals, Dissolved carbonate equilibria, Carbon dioxide in soils, Calcite solubility and PCO2, Carbonate rock aquifers; Ion Exchange: Exchange equations; Redox Processes: Theory, Redox diagrams.

YBL527 Advanced Applied Hydrogeology I 3+0 7.5

Water; The hydrologic cycle, The hydrologic equation, Applied hydrogeology; Evaporation and Precipitation: Evapotranspiration, Formation of precipitation, Measurement of precipitation; Runoff and Streamflow: Events during precipitation, Hydrograph separation, Determining Groundwater recharge from Baseflow, Measurement of streamflow, Manning equation; Properties of Aquifers: Matter and energy, Porosity of Earth materials, Specific yield, Hydraulic conductivity, Permeameters, Aquifers; Principles of Groundwater Flow: Mechanical energy, Hydraulic head, Darcy’s law, Equations of Groundwater Flow, Flow lines and flow nets, Steady flow in an aquifer.

YBL528 Seismology 3+0 7.5

History and Development of Seismology: General Seismology, Plate Tectonics, Exploration Seismology; Main Principles of Seismology: Observational Seismology, Instrumental Seismology, Determination of Earthquake Parameters; Seismological Software: Seismological Data Analysis, Moment Tensor Solution, Earthquake Location Determination; Seismotectonics: Seismicity, Faulting Mechanism, Earthquake Occurrence Pattern, Relation of Earthquakes and Active Faults; Different Application of Seismology: Different Seismological Applications and Network Design.

YBL529 System Identification and Structural Health Monitoring 3+0 7.5

System Identification Techniques: Specific and stochastic input cases; Determination of Modal Parameters Using Frequency and Time Domain Techniques; Structural Health Monitoring Methods; Experimental Modal Analysis Technique; Operational Modal Analysis Technique; Introduction to Signal Processing; Data Collection and Characteristic Property Extraction; Vibration Instrumentation; Vibration Based Damage Detection Methods: Data and model based techniques; Model Calibration Methods.

YBL530 Structural Earthquake Engineering 3+0 7.5

Nature and Causes of Earthquakes: Earthquake magnitude and intensity; Earthquake Ground Motions; Seismic Response Analysis of Simple Structures: Elastic response spectra; Design Spectrum; Seismic Response Analysis of Building Structures: Equivalent lateral load procedure; Modal Superposition; Response Spectrum Analysis Procedure; Basic Design Principles and Performance Requirements for Buildings in Seismic Design Codes: Structural irregularities; Seismic Design of Reinforced Concrete Structures.

YBL531 Potential Theory in Geophysics 3+0 7.5

Vector analyses I: Gradient, Divergence, Curl; Vector analyses II: Divergence theorem, Stokes theorem; Introduction to potantial field theory: Field types, Boundary value problems, Dirac delta function; Gravitational potential and fields: Newton's law of gravitation, Forces due to special bodies; Earth's gravity field: corrections; Electrostatics I: Coulomb's law, Electric fields, Gauss' law; Electrostatics II: Scaler potential, Poisson and Laplace equations, Work and energy in electrostatics; Magnetostatics I: Lorentz force law, Biot-Savart's law, Faraday's Law; Solution to Laplace equation; Method of images; Green's theorem; Geomagnetism and geomagnetic fields.

YBL532 Geological Disasters 3+0 7.5

Inner Structure of the Earth, Plate Tectonics, Geological Structures, Earthquakes: Magnitude, Intensity, Seismic Wave Propagation, Strong Ground Motion, Earthquake Early Warning, Structural and Non-Structural Risks, Seismic Hazard and Risk Analysis, Deterministic and Probabilistic Analyses, Man-Made Seismicity, Triggered and Induced Earthquakes, Liquefaction, Landslides, Tsunami: Generation, Propagation and Coastal Interaction, Tsunami Hazard in Turkey and its Surroundings, Tsunami Awareness and Preparedness, Tsunami Early Warning Systems, Disaster Risk Management: Global Trends and Holistic Approaches, Multi-Hazard/Risk Studies.

YBL533 Laboratory Methods in Earth Engineering I 3+0 7.5

Sample preparation; determination of water content; density-unit weight determination; determination of apparent porosity; water absorption test by weight and volume; slake durability index test; Schmidt hammer test in the laboratory and in the field; point load strength index test; Determination of tensile strength of rocks by Brazilian test method; uniaxial compressive strength test; determination of modulus of elasticity and Poisson's ratio; triaxial compression test; sonic velocity test; wetting-drying test; freeze-thaw test.

YBL534 Geology for Civil and Environmental Engineers 3+0 7.5

Fundamentals of Geology: Earth Structure and Composition, What is Earth Science, Layers of the earth; Geology and Civil Engineering Relationship; Geology and Environmental Engineering Relationship; Geological Structure and Geological Maps; Rock Mechanics; Solid Rock and Rock Mass Characterization; Weathering of Rocks; Erosion; Characterization of Soil Soils; Groundwater; Geological Hazards: Collapse and Karstification, Earthquake, Landslide, Coastal Hazards.

YBL535 Laboratory Methods in Earth Engineering II 3+0 7.5

Laboratory test and report preparation; determination of water content; specific gravity; sieve analysis; hydrometer analysis; liquid limit test; plastic limit test; shrinkage limit test; engineering classification of soils; constant head permeability test; falling head permeability test; standard proctor compaction test; modified proctor compaction test; determination of field unit weight of compaction by sand cone method; direct shear test; unconfined compression test; consolidation test; triaxial tests.

YBL536 Paleoseismology 3+0 7.5

Principles of Paleoseismology: Object, Scope, Definition of paleoearthquakes, Dating methods of paleoearthquakes, Determination of reccurrence intervals of paleoearthquakes; Tecniques of Paleoseismological Investigations: Excavation and cleaning, Gridding, Photographing, Sampling, Logging, Interpretation; Geophysical Methods Applied in Paleoseismological Research; Sub-Aqueous Paleoseismology; Paleoseismology in Extensional Tectonic Environments; Paleoseismology in Compressional Tectonic Environments; Paleoseismology in Strike-slip Tectonic Environments; Paleoseismology in Volcanic Environments; Paleoseismological Investigations in Turkey.

YBL537 Advanced Volcanology 3+0 7.5

The course will introduce students to Plate tectonics and volcanoes; including the processes that takes place at active volcanoes (eruptive mechanisms, effusive and explosive volcanism); methods and instrumentation used to study them; the hazards of different types of eruptions (hazards assessment, integrated hazard mapping, risk communication, and the complex challenges of scientist being involved in the response to a crisis or eruption). It will examine volcano geology (including petrology), and volcanism in Turkey (including economic aspects).

YBL538 Injection Applications in Earth Sciences 3+0 7.5

Definition and Formation of Soil-Rock in Earth Sciences; Soil-Rock Transitions; Weathering Surfaces in Soils and Rocks, Increasing the Bearing Power of Weak Soils; Applications in Engineering Structures on Cracked Rocks; Definition of Injection and Injection Types, Materials Used in Injection; Injection Applications in Discontinuities in Underground Power Plants, Tunnels and Slopes; Injection Applications in Alluviums, Injection in Dam Sites; Anchors in Soils and Rocks, Geotextiles, Geomembranes, Geonets, Geogrids and Unified Geosynthetics

YBL540 The Earth's Physics and Lithosphere Dynamics 3+0 7.5

The Earth's physics and lithosphere dynamics: Evolution of continental and oceanic lithosphere; Plate tectonics; Heat flows from Earth's interior, Thermal modelling of deper depths; Stress and strain; The lithospheric strength and effective elastic thickness, Correlation with seismic activities; Dynamic topograhy; Isostasy and gravity anomalies, Spherical gravity anomalies and modelling in deeper interfaces; Earth's gravitational and magnetic fields.

YBL542 Landslide Investigations and Mitigation 3+0 7.5

Principles, definitions, and assessment: Landslide types and processes; landslide triggering mechanisms; landslide hazard and risk assessment; Site investigations: Organization of investigation process; slope instability recognition, analysis, and zonation; surface observation and geological mapping; subsurface exploration; field instrumentation; Strength and stability analysis: soil strength properties and their measurement; soil slope stability analysis; rock strength properties and their measurement; rock slope stability analysis; Mitigation: Important considerations in slope design; stabilization of soil slopes; stabilization of rock slopes.

YBL544 Advanced Applied Hydrogeology II 3+0 7.5

Soil Moisture and Groundwater Recharge: Porosity and water content of soil, Unsaturated flow; Groundwater Flow to Wells: Basic assumptions, Determining aquifer parameters, Regional Groundwater Flow; Geology of Groundwater Occurrence: Unconsolidated aquifers, Lithified sedimentary rocks, Igneous and metamorphic rocks; Water Chemistry: Types of chemical reactions in water, Isotope hydrology; Water Quality and Groundwater Contamination: water quality standards, Groundwater monitoring, Mass transport of solutes; Groundwater Models: Data requirements for models, Finite element models.

YBL546 The Solution of the Inverse Problem in Geophysical Modelling 3+0 7.5

Geophysical inverse solution: Data and model space, Parametrization; Forward solution; Theoretical principles of linear inverse solution, Physical parameter estimation and numerical examples, Resoluion of linear inverse solution,Theoretical principles of derivative-based nonlinear inversion, Geometrical parameter estimation and numerical examples, Resoluion of nonlinear inverse solution, Singular value decomposition and resolution; Optimzation, Steepest descent optimization, Complex gradient optimization,Particle swarm optimization.

YBL592 Seminar 3+0 7.5

YBL599	**Semester Project**	**3+0**	**0.0**
YBL790	**Thesis**	**0+1**	**30.0**