

FACULTY OF ENGINEERING

Faculty of Engineering and Architecture was established in 1993. The Faculty consists of Architecture, Ceramic Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical and Electronics Engineering and Environmental Engineering departments. The Faculty of Engineering and Architecture is located in the new and modern buildings of İki Eylül Campus. All the students attend one-year obligatory English Preparation School before four-year undergraduate programs. Most of the courses in undergraduate program are taught in English.

Faculty of Engineering and Architecture aims at giving high quality education to students to carry out professional work after graduation. All departments in the Faculty have modern computer facilities and research laboratories.

Turkish Science and Research Council (TÜBİTAK), State Planning Office and University Research Foundation support various projects conducted in the departments of the Faculty. The Faculty of Engineering and Architecture also conducts projects in collaboration with Local and Nation wide companies. There are also cooperative links with universities and research institutions in the U.S.A., Europe and Japan.

Dean	: Prof.Dr. Onur KAYA
Vice-Dean	: Dr. Lecturer Elif Begüm ELÇİOĞLU
Vice-Dean	: Dr. Lecturer Emre ÇİMEN
Secretary to the Faculty	: Mehmet GÜL

STAFF

Professors:

Emin AÇIKKALP, Hüseyin AKÇAY, Cemal AKSEL, Esin APAYDIN VAROL, Gürsoy ARSLAN, Nuray AT, Funda ATEŞ, Özgür AVŞAR, Feridun AY, Nezihe AYAS, Aydın AYBAR, Recep BAKIŞ, Müfide BANAR, Ahmet BAYLAR, Berrin BOZAN, Arzu ÇİÇEK, Oğuz ÇOLAK, Atakan DOĞAN, Aydın DOĞAN, Tuncay DÖĞEROĞLU, Nihal ERGİNEL, Eftade GAGA, Kadir GEDİK, Hasan Ferdi GERÇEL, Özgül Ege GERÇEL, Ömer Nezihe GEREK, Serdar GÖNCÜ, Serkan GÜNAL, Yaşar HOŞCAN, Altuğ İFTAR, Cihan KALELİ, Ferhat KARA, Alpagut KARA, Bekir KARASU, Refail KASIMBEYLİ, Onur KAYA, Süleyman KAYTAKOĞLU, Ö. Mete KOÇKAR, Semra KURAMA, R. Mustafa ÖKSÜZOĞLU, Gökhan ÖZDEMİR, M. Tankut ÖZGEN, Aysun ÖZKAN, Gürkan ÖZTÜRK, Cengiz ÖZZAİM, Cem SEVİK, Abdullah Tuğrul SEYHAN, Ender SUVACI, Ünal ŞEN, Aynur ŞENSOY ŞORMAN, Mustafa TOMBUL, Ahmet TUNCAN, Mustafa TUNCAN, Servet TURAN, Ümran ÜN, Yusuf YAVUZ

Associate Professors:

Sema AKYALÇIN, Hanife APAYDIN ÖZKAN, Nil ARAS, Erhan AYAS, Ümmühan BAŞARAN FİLİK, Hande ÇELEBİ, Ali ÇELİK, Ahmet Ozan ÇELİK, Tansu FİLİK, Emin GERMEN, Yeşim GÜÇBİLMEZ, Zerrin GÜNKAYA, Zehra KAMIŞLI ÖZTÜRK, İrfan KAYA, Serkan KIVRAK, Mehmet KOÇ, Nihan KOSKU PERKGÖZ, Semra MALKOÇ, Elif ÖDEŞ AKBAY, Hakan Güray ŞENEL, Hakan ŞİRİN, Haluk YAPICIOĞLU, Tolga YASA

Faculty Members:

İlgin ACAR, Şener AĞALAR, Levent AKYALÇIN, Mehmet ALEGÖZ, Evren ARIÖZ, Ahmet ARSLAN, Eren BALABAN, İlker BALCILAR, Zeynep BATMAZ, Suzan BİRAN AY, Ali BOZER, Sema CANDEMİR, Yasemin ÇELİK, Bülent ÇİFTPINAR, Emre ÇİMEN, Elif DEMİREL, Gülçin DİNÇ YALÇIN, Leman Esra DOLGUN, Emrah DÖLEKÇEKİÇ, Elif Begüm ELÇİOĞLU, Hüseyin Ersin EROL, Burak EVİRGİN, Emine Esra GEREK, Çağla Gül GÜLDİKEN, Sıtkı GÜNER, Emir Zafer HOŞGÜN, Selcan KAPLAN BERKAYA, Filiz KAREL, Zühal KARTAL, Nergiz KASIMBEYLİ, Bekir Tuna KAYAALP, Elif KAYNAK, Murat KILIÇ, Mehmet KILIÇARSLAN, Seval KINDEN, Altan ONAT, Mehmet İnanç ONUR, S.eren ÖCAL, Asım Anıl ÖNDER, Derya ÖVER KAMAN, Yalçın ÖZDEMİR, Özlem ÖZDEN ÜZMEZ, İsmail Özgür ÖZER, Erdem ÖZYURT, Cahit PERKGÖZ, H. Boğaç POYRAZ, Özgür POYRAZ, İsmail SAN, Umut SAVACI, Gül İpek SELİMOĞLU, Hasan ŞAHİN, Ali Arda ŞORMAN, Kıvanç TAŞKIN, Cihan TOPAL, İrfan TÖRE, Onur TUNABOYU, Semiha TÜRKAY, Can UYSAL, Gökçen UYSAL, Hakkı Ulaş ÜNAL, Sevcan YILMAZ GÜNDÜZ, Burcu YILMAZEL, Zehra YİĞİT AVDAN, Ali YÜREKLİ

Lecturers:

Orkun BAŞKAN, Sinem BAŞKUT, Banu GÜNER, Esra KAÇAR, Emre KAÇMAZ, Fadime KARAEER, Özgür ÖZŞEN, Muhsin YALÇIN

Research Assistants:

Müge ACAR, Emine AKYOL ÖZER, Oğuzkağan ALIÇ, Ahmet AYDIN, Perihan BEKDEMİR, Canberk BOLAT, Gürhan CEYLAN, Emrah DEMİR, Emin Talip DEMİRKIRAN, Kamil Burak DERMENCİ, Zeliha ERGÜL, Emine ERSEZER, Sevda ERYILMAZ, Zeynep İdil ERZURUM, Şehnaz GENÇ, Gökhan GÖKSEL, Banu İÇMEN, Mutlu KARAŞOĞLU, Eren KAYA, Burcu KİREN, Volkan KİRİÇÇİ, Okan KOÇKAYA, Nesil ÖZBAKAN, Salih Çağrı ÖZER, Mahmut ÖZTÜRK, Fırat SEZGİN,

Burcu ŞİMŞEK UYGUN, Murat TAMER, Tansu TEMEL, Şura TOPTANCI, Fatih TURAN, Emre URAZ, Fikret YAMAN, Özen YELBAŞI, Abdulkadir ZİREK

DEPARTMENT OF COMPUTER ENGINEERING (ENGLISH)

The Department was established in 1993. The department is located at the İki Eylül Campus and occupies a covered area of 5000 m². 1 Professors, 2 Associate Professor, 3 Assistant Professors, 4 Instructors and 7 Research Assistants are currently working in the department. The decisions related with the department are made by the department council which is composed of all faculty members of the department. The department is governed by one chairman and one deputy chairmen. Department of Computer Engineering leading to an undergraduate degree started in the 2000-2001 academic year. As every year 40 students are planned to be accepted to the program, the medium of instruction is English.

Department Head : Prof.Dr. Serkan GÜNAL
Deputy Department Head : Dr. Lecturer Selcan KAPLAN BERKAYA

PROGRAM

I.Semester				II.Semester			
BİM101 (Eng)	Computer Programming I	3+2	7.0	BİM102 (Eng)	Computer Programming II	3+0	6.0
FİZ105 (Eng)	Physics I	4+0	6.0	BİM122 (Eng)	Discrete Computational Structures	3+0	5.0
FİZ107 (Eng)	Physics Laboratory I	0+2	1.5	FİZ106 (Eng)	Physics II	4+0	6.0
KİM113 (Eng)	General Chemistry	4+0	6.0	FİZ108 (Eng)	Physics Laboratory II	0+2	1.5
MAT805 (Eng)	Calculus I	4+2	7.5	MAT806 (Eng)	Calculus II	4+2	7.5
TÜR125	Turkish Language I	2+0	2.0	TÜR126	Turkish Language II <i>Seçmeli Dersler</i>	2+0 --	2.0 2.0
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			30.0				30.0
III.Semester				IV.Semester			
BİM203 (Eng)	Logic Design	4+0	6.0	BİM204 (Eng)	Numeric Analysis for Computer Engineers	3+0	3.5
BİM207 (Eng)	Computer Programming III	2+2	6.0	BİM208 (Eng)	Computer Programming IV	3+0	5.5
BİM209 (Eng)	Principles of Software Design and Development	3+0	6.0	BİM222 (Eng)	Internet Programming	3+0	4.5
BİM213 (Eng)	Data Structures and Algorithms	2+2	5.5	BİM312 (Eng)	Database Management Systems	3+0	6.0
MAT249 (Eng)	Linear Algebra and Differential Equations	3+0	4.5	BİM314 (Eng)	Theory of Computation	3+0	4.5
TAR165	Atatürk's Principles and History of Turkish Revolution I	2+0	2.0	İST252 (Eng)	Probability and Statistics	3+0	4.0
				TAR166	Atatürk's Principles and History of Turkish Revolution II	2+0	2.0
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			30.0				30.0
V.Semester				VI.Semester			
BİM303 (Eng)	Microcomputers	3+2	7.0	BİM302 (Eng)	Computer Networks	3+0	4.5
BİM305 (Eng)	Computer Organization	3+0	5.0	BİM304 (Eng)	Computer Algorithm Design	3+0	6.0
BİM311 (Eng)	Systems Analysis and Design	3+0	4.5	BİM306 (Eng)	Operating Systems	3+0	4.5

MAT247 (Eng)	Engineering Mathematics (Mühendislik Matematiği)	4+0	7.0	BİM308 (Eng)	Web Server Programming	3+0	6.0
	<i>Mesleki Seçmeli Dersler</i>	--	4.5		<i>Mesleki Seçmeli Dersler</i>	--	4.5
	<i>Seçmeli Dersler</i>	--	2.0		<i>Seçmeli Dersler</i>	--	4.5
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			30.0				30.0

VII.Semester

BİM437 (Eng)	Computer Engineering Design	1+2	4.0
iSG401	Occupational Health and Safety I	2+0	2.0
	<i>Mesleki Seçmeli Dersler</i>	--	18.0
	<i>Seçmeli Dersler</i>	--	6.0

			30.0

VIII.Semester

BİM444 (Eng)	Computer Engineering Applications	2+4	7.0
iSG402	Occupational Health and Safety II	2+0	2.0
	<i>Mesleki Seçmeli Dersler</i>	--	18.0
	<i>Seçmeli Dersler</i>	--	3.0

			30.0

Elective Courses

ALM255 (Ger)	German I			3+0	4.0
ALM256 (Ger)	German II			3+0	4.0
ALM357 (Ger)	German III			3+0	4.0
ALM358 (Ger)	German IV			3+0	4.5
ARK108	Archaeology			2+0	2.0
BEÖ155	Physical Education			2+0	2.0
BİM411 (Eng)	Decision Support Systems			3+0	3.0
ESTÜ101	Introduction to University Life			0+1	2.0
ESTÜ102 (Eng)	Negotiation Techniques Class			2+0	3.0
ESTÜ103	Ceramic Design Processes			2+1	3.0
ESTÜ104	Academic and Life Skills			2+1	3.0
ESTÜ106	Proje Yönetimi			2+1	3.0
ESTÜ111	Volunteering Works			1+2	4.0
ESTÜ112	Cyber Security for Everyone			2+0	2.0
ESTÜ113	Design Thinking			3+0	3.0
ESTÜ114	Visual Thinking			3+0	3.0
ESTÜ115	Photographic Viewpoint			2+1	3.0
ESTÜ116	Computer Aided Design I			3+0	3.0
ESTÜ117	Computer Aided Design II			3+0	3.0
ESTÜ118	Visual Thinking with Concepts			3+0	3.0
ESTÜ119	Flute			3+1	3.0
ESTÜ120	Solfege			3+1	3.0
ESTÜ121	Piano			3+1	3.0
ESTÜ122	Guitar			3+1	3.0
ESTÜ123	Gender Equality in Work Life			2+0	3.0
ESTÜ125	Philosophy of Science			3+0	3.0
ESTÜ127	Diction			1+2	3.0
ESTÜ201	Turkish Sign Language			3+0	3.0
ESTÜ203	Introduction to Sociology			3+0	3.0
ESTÜ301	Science Communication			2+0	3.0
ESTÜ401	Introduction to Professional Life			1+1	2.0
ESTÜ403	Basic Computer Utilization			3+0	4.0
ESTÜ405	Computer Programming			3+0	5.0
FOT202	Photography			2+0	3.0
FRA255 (Fra)	French I			3+0	4.0
FRA256 (Fra)	French II			3+0	4.0
HUK458	Industrial Rights and Technological Development			3+0	3.0
iKT151 (Eng)	Economics			3+0	3.0
iKT356 (Eng)	Engineering Economics			3+0	4.5
İLT201 (Eng)	Interpersonal Communication			3+0	4.5
İLT419	Body Language and Diction			2+0	5.0
iSN309 (Eng)	Mass Media			3+0	3.0
iSP151 (Spa)	Spanish I			4+0	4.0

iSP152 (Spa)	Spanish II	4+0	4.0
iŞL101 (Eng)	Introduction to Business	3+0	4.5
iŞL301 (Eng)	Human Resources Management	3+0	4.0
iŞL321	Applied Entrepreneurship	3+1	5.0
iŞL475	Techno-Entrepreneurship	3+0	4.0
iTA255 (İta)	Italian I	3+0	4.0
iTA256 (İta)	Italian II	3+0	4.0
JAP301 (Jap)	Japanese I	4+0	4.0
JAP302 (Jap)	Japanese II	4+0	4.0
MUH151 (Eng)	Introduction to Accounting	3+0	4.5
MÜH402 (Eng)	Engineering Ethics	2+0	3.0
MÜH404 (Eng)	Innovation Management	3+0	3.0
MÜZ151	Short History of Music	2+0	3.0
MÜZ157	Traditional Turkish Art Music	2+0	2.0
NÜM301 (Eng)	Numerical Methods	3+0	3.5
PSİ102 (Eng)	Psychology	3+0	3.5
PZL302 (Eng)	Marketing Management	3+0	4.5
RUS255 (Rus)	Russian I	3+0	4.0
RUS256 (Rus)	Russian II	3+0	4.0
SNT155	History of Art	2+0	2.0
THU203	Community Services	0+2	3.0
TiY121	Introduction to Theatre	2+0	3.0
TiY152	Theatre	2+0	2.5
TiY308	Republic Era Turkish Theatre	2+0	3.0

Area Elective Courses

BiM309 (Eng)	Artificial Intelligence	3+0	4.5
BiM405 (Eng)	Project Management	3+0	4.5
BiM423 (Eng)	Software Engineering	3+2	6.0
BiM439 (Eng)	Applications of Database Management Systems	3+0	4.5
BiM441 (Eng)	Introduction to Rough Sets Theory	3+0	4.5
BiM443 (Eng)	Blockchain and Cryptocurrency Technologies	3+0	4.5
BiM445 (Eng)	Enterprise IT Architecture	2+0	3.0
BiM446 (Eng)	Analysis of Algorithms	3+0	4.5
BiM448 (Eng)	Computer Graphics	3+0	4.5
BiM450 (Eng)	Network Management	3+0	4.5
BiM451 (Eng)	Web Server Programming with MVC	3+0	4.5
BiM452 (Eng)	Multimedia Computing	3+0	4.5
BiM453 (Eng)	Introduction to Machine Learning	3+0	4.5
BiM454 (Eng)	Programming Language Concepts	3+0	4.5
BiM455 (Eng)	Introduction to Hardware Design	3+0	4.5
BiM456 (Eng)	Network Security Principles	3+0	4.5
BiM457 (Eng)	Embedded Programming Languages	3+0	4.5
BiM458 (Eng)	Simulation and Modeling	3+0	4.5
BiM460 (Eng)	Software Modeling	3+0	4.5
BiM462 (Eng)	Parallel Systems	3+0	4.5
BiM464 (Eng)	Human-Computer Interaction	3+0	4.5
BiM466 (Eng)	Fuzzy Logic	3+0	4.5
BiM468 (Eng)	Computer Aided Design	3+0	4.5
BiM470 (Eng)	Neural Networks	3+0	4.5
BiM472 (Eng)	Image Processing	3+0	4.5
BiM474 (Eng)	Introduction to Cryptography	3+0	4.5
BiM476 (Eng)	Data Acquisition and Processing	3+0	4.5
BiM478 (Eng)	Management Information Systems	3+0	4.5
BiM480 (Eng)	Compiler Design	3+0	4.5
BiM482 (Eng)	Network Programming	3+0	4.5
BiM484 (Eng)	Distributed Systems	3+0	4.5
BiM485 (Eng)	Research in Computer Science I	3+0	4.5
BiM486 (Eng)	Research in Computer Science II	3+0	4.5
BiM488 (Eng)	Introduction to Pattern Recognition	3+0	4.5
BiM490 (Eng)	Introduction to Information Retrieval	3+0	4.5
BiM492 (Eng)	Design Patterns	3+0	4.5
BiM493 (Eng)	Mobile Programming I	3+0	4.5

BİM494 (Eng)	Mobile Programming II	3+0	4.5
BİM496 (Eng)	Computer Vision	3+0	4.5
BİM498 (Eng)	Embedded Software Design	3+0	4.5
EEM305 (Eng)	Signals and Systems	3+0	4.5
EEM334 (Eng)	Digital Systems II	3+0	5.0
EEM463 (Eng)	Introduction to Image Processing	3+0	5.0
ENM440 (Eng)	Introduction to Data Mining	3+0	4.5
MÜH302 (Eng)	Interdisciplinary Applications	1+2	4.5

SOFTWARE AND OPTIMIZATION MINOR PROGRAM

DEPARTMENT OF ENVIRONMENTAL ENGINEERING (30% ENGLISH)

Environmental Engineering is profession to protect the environment from being polluted by human activities and conversely to protect humans from being affected adversely by the impacts of a polluted environment. The principal tasks of an environmental engineer are Design and management of the sanitary infrastructure and of water and wastewater treatment facilities. Air pollution abatement Solid waste management Protection of natural environments Noise pollution abatement Environmental assessment Legal and economical aspects of pollution control and prevention. The department was established in the 1994-1995 academic year. With the re-location of the Faculty of Engineering and Architecture to its new facility on İki Eylül Campus, the Environmental Engineering Department has improved its education with new classrooms, laboratories, computer labs and other physical facilities. 9 Professor, 4 Associate Professors, 5 Assistant Professors, 1 Lecturer and 4 Assistants are currently working in the department. The department is governed by one chairman and two deputy chairmen.

Department Head	: Prof.Dr. Aysun ÖZKAN
Deputy Department Head	: Dr. Lecturer İlker BALÇILAR
Deputy Department Head	: Dr. Lecturer Alp ÖZDEMİR

PROGRAM

I.Semester				II.Semester			
ÇEV209 (Eng)	Technical English I	3+0	2.5	ÇEV203 (Eng)	Introduction to Environmental Engineering	2+0	3.5
FİZ105	Physics I	4+0	6.0	FİZ106	Physics II	4+0	6.0
FİZ107	Physics Laboratory I	0+2	1.5	FİZ108	Physics Laboratory II	0+2	1.5
KİM117 (Eng)	General Chemistry I	4+0	6.0	KİM115 (Eng)	General Chemistry Laboratory	0+2	1.5
MAT805	Calculus I	4+2	7.5	KİM118 (Eng)	General Chemistry II	4+0	6.0
TRS127	Technical Drawing	2+2	4.5	MAT806	Calculus II	4+2	7.5
TÜR125	Turkish Language I	2+0	2.0	TÜR126	Turkish Language II	2+0	2.0
					<i>Seçmeli Dersler</i>	--	2.0
			----				----
			30.0				30.0
III.Semester				IV.Semester			
ÇEV210 (Eng)	Technical English II	2+0	2.0	BiY353	Environmental Microbiology	3+0	4.5
ÇEV211	Environmental Chemistry Laboratory I	0+3	3.0	BiY357	Environmental Microbiology Laboratory	0+3	2.5
ÇEV213	Environmental Chemistry I	3+0	4.5	ÇEV206 (Eng)	Environmental Chemistry II	3+0	4.5
ÇEV219	Ecology	3+0	4.5	ÇEV212 (Eng)	Environmental Chemistry Laboratory II	0+3	3.0
İKT151	Economics	3+0	3.0	ÇEV214	Environmental Ethics and Engineering Practices	2+0	2.0
MAT219	Differential Equations	2+2	4.5	ÇEV216	Sustainability, Innovation and Project Management in Environmental Engineering	2+0	2.5

MLZ203 (Eng)	Materials Science	3+0	3.5	MEK215 (Eng)	Statics and Strength of Materials	3+0	4.5
TAR165	Atatürk's Principles and History of Turkish Revolution I <i>Seçmeli Dersler</i>	2+0	2.0	NÜM202	Linear Algebra and Numerical Methods	4+0	4.5
		--	3.0	TAR166	Atatürk's Principles and History of Turkish Revolution II	2+0	2.0
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			30.0				30.0

V.Semester

ÇEV305 (Eng)	Unit Operations and Processes I	4+0	6.0
ÇEV310	Water and Soil Pollution	3+0	4.5
ÇEV313 (Eng)	Unit Operations and Processes Laboratory I	0+3	3.0
İNŞ308 (Eng)	Hydrology	3+0	4.5
MEK315	Fluid Mechanics <i>Mesleki Seçmeli Dersler</i>	3+2	6.0
	<i>Seçmeli Dersler</i>	--	3.0

			30.0

VI.Semester

ÇEV312	Water Supply and Sewerage	3+0	4.5
ÇEV314 (Eng)	Unit Operations and Processes Laboratory II	0+3	3.5
ÇEV316 (Eng)	Air Pollution	3+0	4.5
ÇEV324 (Eng)	Unit Operations and Processes II	4+0	6.0
İST201	Statistics	3+0	3.0
TER403	Thermodynamics <i>Mesleki Seçmeli Dersler</i>	3+0	4.5
		--	4.0

			30.0

VII.Semester

ÇEV421	Solid Waste Management	3+2	6.0
ÇEV427 (Eng)	Air Pollution Control	3+0	4.5
ÇEV445 (Eng)	Environmental Modeling	3+0	4.5
ÇEV447 (Eng)	Wastewater Engineering	3+0	4.0
ÇEV449	Graduation Project in Environmental Engineering I	1+2	3.0
ÇEV475	Environmental Legislation I	2+0	3.0
İSG401	Occupational Health and Safety I <i>Mesleki Seçmeli Dersler</i>	2+0	2.0
		--	3.0

			30.0

VIII.Semester

ÇEV438	Environmental Management	3+2	6.0
ÇEV442	Hazardous Waste Management	3+0	4.5
ÇEV450	Graduation Project in Environmental Engineering II	2+4	6.0
İSG402	Occupational Health and Safety II <i>Mesleki Seçmeli Dersler</i>	2+0	2.0
		--	8.5
	<i>Seçmeli Dersler</i>	--	3.0

			30.0

Elective Courses

ALM255 (Ger)	German I	3+0	4.0
ALM256 (Ger)	German II	3+0	4.0
ALM357 (Ger)	German III	3+0	4.0
ALM358 (Ger)	German IV	3+0	4.5
ARK108	Archaeology	2+0	2.0
BEÖ155	Physical Education	2+0	2.0
ÇEV319	Scientific Reading and Writing Skills	2+0	3.0
ESTÜ101	Introduction to University Life	0+1	2.0
ESTÜ103	Ceramic Design Processes	2+1	3.0
ESTÜ104	Academic and Life Skills	2+1	3.0
ESTÜ106	Proje Yönetimi	2+1	3.0
ESTÜ111	Volunteering Works	1+2	4.0
ESTÜ112	Cyber Security for Everyone	2+0	2.0
ESTÜ113	Design Thinking	3+0	3.0

ESTÜ114	Visual Thinking	3+0	3.0
ESTÜ115	Photographic Viewpoint	2+1	3.0
ESTÜ116	Computer Aided Design I	3+0	3.0
ESTÜ117	Computer Aided Design II	3+0	3.0
ESTÜ118	Visual Thinking with Concepts	3+0	3.0
ESTÜ119	Flute	3+1	3.0
ESTÜ120	Solfege	3+1	3.0
ESTÜ121	Piano	3+1	3.0
ESTÜ122	Guitar	3+1	3.0
ESTÜ123	Gender Equality in Work Life	2+0	3.0
ESTÜ125	Philosophy of Science	3+0	3.0
ESTÜ127	Diction	1+2	3.0
ESTÜ201	Turkish Sign Language	3+0	3.0
ESTÜ203	Introduction to Sociology	3+0	3.0
ESTÜ301	Science Communication	2+0	3.0
ESTÜ401	Introduction to Professional Life	1+1	2.0
ESTÜ403	Basic Computer Utilization	3+0	4.0
ESTÜ405	Computer Programming	3+0	5.0
FEL102	Introduction to Philosophy	2+0	2.5
FEL401	Philosophy of Science	2+0	2.5
FOT202	Photography	2+0	3.0
FRA255 (Fra)	French I	3+0	4.0
FRA256 (Fra)	French II	3+0	4.0
HUK252	Labor Law	2+0	2.5
HUK458	Industrial Rights and Technological Development	3+0	3.0
İLT201	Interpersonal Communication	3+0	4.5
İLT370	New Approaches in Management	3+0	6.5
İLT419	Body Language and Diction	2+0	5.0
iSN309	Mass Media	3+0	3.0
iŞL101	Introduction to Business	3+0	4.5
iŞL321	Applied Entrepreneurship	3+1	5.0
iŞL454 (Eng)	Management of Technology	3+0	4.5
iŞL475	Techno-Entrepreneurship	3+0	4.0
iTA255 (İta)	Italian I	3+0	4.0
iTA256 (İta)	Italian II	3+0	4.0
JAP301 (Jap)	Japanese I	4+0	4.0
JAP302 (Jap)	Japanese II	4+0	4.0
KÜL451 (Eng)	History of Science and Engineering	3+0	4.5
MÜH402	Engineering Ethics	2+0	3.0
MÜH404	Innovation Management	3+0	3.0
MÜZ151	Short History of Music	2+0	3.0
MÜZ157	Traditional Turkish Art Music	2+0	2.0
PSİ102	Psychology	3+0	3.5
PZL302	Marketing Management	3+0	4.5
RUS255 (Rus)	Russian I	3+0	4.0
RUS256 (Rus)	Russian II	3+0	4.0
SNT155	History of Art	2+0	2.0
SOS153	Sociology	3+0	3.5
SOS154	Man and Sociology	2+0	3.0
TAR201	History of Science	2+0	2.5
THU203	Community Services	0+2	3.0
TİY121	Introduction to Theatre	2+0	3.0
TİY152	Theatre	2+0	2.5
TİY308	Republic Era Turkish Theatre	2+0	3.0

Area Elective Courses

BİL301 (Eng)	Computer Programming in Engineering	2+1	3.5
BİL486	Computer Applications in Environmental Engineering	2+1	3.0
ÇEV309	Social Environmental Science	2+0	3.0
ÇEV311	Environmental Economy	2+0	3.0
ÇEV315	Bioremediation Technologies	3+0	4.5
ÇEV317	Agricultural Environmental Pollution	2+0	3.0
ÇEV320	Environmental Problems Resulting from Energy Production	3+0	4.0
ÇEV326	Information Technologies in Environmental Engineering	3+0	4.0

ÇEV328 (Eng)	Instrumental Analysis in Environmental Studies	3+0	4.5
ÇEV332	Introduction to Ecological Economy	3+0	4.5
ÇEV336	Environmental Health	3+0	4.5
ÇEV340	Applied of Environmental Statistics Analysis	2+0	3.0
ÇEV408	Water Quality Assessment	3+0	4.0
ÇEV409	Experimental Design	3+0	4.0
ÇEV413 (Eng)	Flow Through Porous Media and Modeling	3+0	4.0
ÇEV423	Applications of Remote Sensing and GIS in Environmental Sciences	3+0	4.5
ÇEV431	Water Treatment Project	1+2	4.0
ÇEV432	Wastewater Treatment Project	1+2	4.0
ÇEV443	Water Reuse	2+0	3.0
ÇEV444	Solid Waste Management Project	1+2	4.0
ÇEV448 (Eng)	Coastal Zone Management	2+0	3.0
ÇEV453	Environmental Ethics and Environmental Engineering	3+0	4.5
ÇEV457	Computer Aided Mapping at Engineering Science	3+0	4.5
ÇEV459 (Eng)	Principles of Biological Treatment	3+0	4.0
ÇEV461	Green Engineering Design and Sustainability	3+0	4.5
ÇEV462 (Eng)	Computer Aided Engineering Design	3+0	4.5
ÇEV463	Quality Management Systems in Environmental Engineering	3+0	4.5
ÇEV464 (Eng)	Industrial Hygiene and Work Safety	2+0	3.0
ÇEV465	Sludge Treatment and Disposal	3+0	4.5
ÇEV466	Ecological Planning and Ecotechnology	2+0	3.0
ÇEV467 (Eng)	Environmental Exposure Assessment	3+0	4.5
ÇEV468	Watershed Management	2+0	3.0
ÇEV469	Water and Waswater Treatment Using Membrane Systems and Processing	3+0	4.5
ÇEV471	Noise Pollution and Control	2+1	4.5
ÇEV472	Environmental Politics	3+0	4.5
ÇEV474 (Eng)	Environmental Reactions and Reactor Kinetics	3+0	4.5
ÇEV476	Environmental Legislation II	2+0	3.0
ÇEV478	Atmospheric Chemistry	3+0	4.5
ÇEV480	Air Pollution Meteorology and Atmospheric Dispersion	3+0	4.0
ÇEV482	Air Pollution Laboratory	1+2	3.0
ÇEV484	Small-scale Wastewater Treatment Systems	2+0	3.0
ÇEV486	Industrial Wastewater Treatment	3+0	4.0
ÇEV488	Landfill Design	3+0	4.0
ÇEV489	Advanced Treatment of Water and Wastewater I	3+0	4.0
ÇEV490	Advanced Treatment of Water and Wastewater II	3+0	4.0
ÇEV492	Air Quality Management Project	1+2	4.0
ÇEV494	Environmental Auditing	2+1	4.5
ÇEV496	Microbiological Treatment Methods	2+0	3.0
ÇEV498	Health-Care Waste Management	2+0	3.0
MÜH302	Interdisciplinary Applications	1+2	4.5

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING (ENGLISH)

ABOUT THE DEPARTMENT Department of Electrical and Electronics Engineering was first established in 1980 and then became a part of the Faculty of Engineering and Architecture of Anadolu University in 1982. However, when this faculty became a part of the newly established Osmangazi University in August 1993, a new Faculty of Engineering and Architecture and, as a part of this new faculty, a new Department of Electrical and Electronics Engineering were established at Anadolu University. Presently there are 4 professors, 4 associate professors, and 5 assistant professors, adding up to thirteen full-time faculty members accompanied by 13 associates working with the department. Furthermore, some faculty members from other departments in our university and from other universities also work as adjunct faculty members in our department. The undergraduate program (leading to the B.S. degree) in our department has started in the 1997-1998 academic year. Currently there are about 380 undergraduates studying in the department including the 62 students in the English preparatory classes. The language of the instruction in the undergraduate program is English. Graduate education (leading to M.S. and Ph.D. degrees) with specializations in systems and control theory, digital systems, power electronics, and signal and image processing and recognition, computer networks and architecture is being offered since the 1994-95 academic year. Currently, there are over 30 graduate students studying in the department. A number of research projects, funded by various organizations such as the Scientific and Technical Research Council of Turkey and the State Planning Organization of Turkey and by the University Research Fund are being conducted or have recently been completed in the department. In our department which is housed in three blocks, totaling 5567 m² closed surface area, there are nine laboratories, from Electrical Circuits and Measurements laboratory to Advanced Control Systems and Robotics laboratory, which are fully equipped and are being used

for education and research. Each academic staff member of the department has a personal computer for his/her own exclusive use provided by the university. A computer laboratory equipped with 30 personal computers, which are connected to the Internet, is open to our students. In addition, in the other laboratories of our department there are many personal computers for the use of the department staff and students. Academic staff and students of the department may also use the computer facilities of the Faculty of Engineering and Architecture and of the Anadolu University Computing Center. PROGRAMS OFFERED The department offers Bachelor of Science (BS), Master of Science (MS) and Doctorate of Philosophy (PhD) programs . The degrees from postgraduate programs are awarded by the Graduate School of Sciences. For M.S. and Ph.D. programs, the university and department announce their requirements for selecting students. Certain exams may be applied to the applicants before they can be placed to M.S. and Ph.D. programs. B.S. (Bachelor of Science)

For B.S. (Bachelor of Science), students are selected by National University Entrance Examination (Student Placement Exam, OSS). About 62 students are admitted each year. Normal duration is 4 years excluding the English preparatory school. Students must take and pass all necessary courses and reach a minimum GPA (Grade Point Average) of 2.00 before graduation. The official language of instruction is English. Students who fail to pass an English language level determination test must attend a one-year English preparatory school and pass it before proceeding with the department courses. Besides regular lectures during fall and spring semesters that should lead to a minimum of 240 ECTS credits, all B.S. students are required to perform summer practice as a part of graduation requirements. They must complete a summer practice of at least 40 working days. A report prepared at the end of summer practice should reflect both the practical experience and the knowledge gained in the practice taken during the engineering education. M.S. - with thesis (Master of Science - with thesis) Attendants of this program are required to take 7 courses and 1 seminar. After that, they are required to prepare and orally defend a thesis based on their research. The students normally need 2 years to complete the program. The program is intended to raise students that are more academically and research oriented. M.S.- without thesis (Master of Science - without thesis) Students that attend this program need to take 10 courses and 1 project. The program takes approximately 1.5 - 2 years to complete. This program is intended more for students who want to specialize in industrial topics or to improve their knowledge about more advanced topics. Ph.D. (Doctorate of Philosophy)

The Doctorate degree requires course work and thesis research. The students will conduct original research and prepare a thesis, then make an oral defense of their completed research. Students require about four years beyond the Master's degree to complete a Ph.D. program. OUR VISION, MISSION, and FUNDAMENTAL VALUES OUR VISION Our vision is to become a prestigious department that will be ranking one among the top national and international electrical-electronics engineering departments in terms of education, research, and research applications. OUR MISSION With our powerful technologic infrastructure capabilities, to provide our students the education so that they will have all the knowledge and capability required by the electrical-electronics engineering profession, be able to use this knowledge and capability for the benefit of the humanity, be able to renew themselves continuously, have the professional and ethical responsibility, be modern and creative, have the project development ability, be highly socially conscientious engineers; to do research and disseminate results in electrical-electronics fields where the research may contribute to the knowledge and technological progress needed by the society.

OUR FUNDAMENTAL VALUES hardworking and organized, self confident, honest and reliable, visionary and open minded, valuing the students and the staff, innovative, conscientious for the team work, having principles of seeking, acquiring, producing, and disseminating the information, progressing and renovating, having professional ethical values.

Department Head : Prof.Dr. Nuray AT
Deputy Department Head : Dr. Lecturer Can UYSAL
Deputy Department Head : Dr. Lecturer Altan ONAT

PROGRAM

I.Semester				II.Semester			
BİM122 (Eng)	Discrete Computational Structures	3+0	5.0	EEM102 (Eng)	Introduction to Electrical Engineering	4+2	7.5
FİZ105 (Eng)	Physics I	4+0	6.0	EEM104 (Eng)	Professional Aspects of Electrical & Electronics Engineering	2+0	3.0
FİZ107 (Eng)	Physics Laboratory I	0+2	1.5	FİZ106 (Eng)	Physics II	4+0	6.0
KİM113 (Eng)	General Chemistry	4+0	6.0	FİZ108 (Eng)	Physics Laboratory II	0+2	1.5
MAT805 (Eng)	Calculus I	4+2	7.5	MAT251 (Eng)	Linear Algebra	3+0	4.5
TÜR125	Turkish Language I	2+0	2.0	MAT806 (Eng)	Calculus II	4+2	7.5
	<i>Seçmeli Dersler</i>	--	2.0				
			----				----
			30.0				30.0
III.Semester				IV.Semester			
BİL200 (Eng)	Computer Programming	2+2	6.0	EEM208 (Eng)	Electromagnetic Fields and Waves	4+0	7.0

EEM206 (Eng)	Electrical Circuits Laboratory	1+2	3.0	EEM210 (Eng)	Fundamentals of Semiconductor Device	3+0	5.0
EEM209 (Eng)	Circuit Analysis	4+1	7.5	EEM232 (Eng)	Digital Systems I	4+0	7.0
MAT219 (Eng)	Differential Equations	2+2	4.5	EEM238 (Eng)	Digital Systems Laboratory	0+2	2.0
MAT293 (Eng)	Engineering Mathematics and Statistics	4+0	7.0	İST244 (Eng)	Engineering Probability	3+0	5.0
TAR165	Atatürk's Principles and History of Turkish Revolution I	2+0	2.0	TAR166	Atatürk's Principles and History of Turkish Revolution II	2+0	2.0
				TÜR126	Turkish Language II	2+0	2.0
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			30.0				30.0

V.Semester

EEM301 (Eng)	Signals and Systems	4+0	7.0
EEM311 (Eng)	Principles of Energy Conversion	3+2	7.0
EEM321 (Eng)	Electronics I	3+0	5.0
EEM328 (Eng)	Electronics Laboratory	1+2	3.0
İKT151 (Eng)	Economics	3+0	3.0
	<i>Seçmeli Dersler</i>	--	5.0

			30.0

VI.Semester

EEM308 (Eng)	Introduction to Communications	3+2	6.5
EEM336 (Eng)	Microprocessors I	3+2	7.0
EEM342 (Eng)	Fundamentals of Control Systems	3+2	7.0
İŞL101 (Eng)	Introduction to Business	3+0	4.5
	<i>Seçmeli Dersler</i>	--	5.0

			30.0

VII.Semester

EEM413 (Eng)	Electrical and Electronics Engineering Design Project I	1+5	3.0
EEM415 (Eng)	Engineering Design and Research	2+0	3.0
İSG401	Occupational Health and Safety I	2+0	2.0
	<i>Mesleki Seçmeli Dersler</i>	--	20.0
	<i>Seçmeli Dersler</i>	--	2.0

			30.0

VIII.Semester

EEM414 (Eng)	Electrical and Electronics Engineering Design Project II	1+5	6.0
İSG402	Occupational Health and Safety II	2+0	2.0
	<i>Mesleki Seçmeli Dersler</i>	--	15.0
	<i>Seçmeli Dersler</i>	--	7.0

			30.0

Elective Courses

ALM255 (Ger)	German I	3+0	4.0
ALM256 (Ger)	German II	3+0	4.0
ALM357 (Ger)	German III	3+0	4.0
ALM358 (Ger)	German IV	3+0	4.5
ARK108	Archaeology	2+0	2.0
BEÖ155	Physical Education	2+0	2.0
ESTÜ101	Introduction to University Life	0+1	2.0
ESTÜ102 (Eng)	Negotiation Techniques Class	2+0	3.0
ESTÜ103	Ceramic Design Processes	2+1	3.0
ESTÜ104	Academic and Life Skills	2+1	3.0
ESTÜ106	Proje Yönetimi	2+1	3.0
ESTÜ111	Volunteering Works	1+2	4.0
ESTÜ112	Cyber Security for Everyone	2+0	2.0
ESTÜ113	Design Thinking	3+0	3.0
ESTÜ114	Visual Thinking	3+0	3.0
ESTÜ115	Photographic Viewpoint	2+1	3.0
ESTÜ116	Computer Aided Design I	3+0	3.0

ESTÜ117	Computer Aided Design II	3+0	3.0
ESTÜ118	Visual Thinking with Concepts	3+0	3.0
ESTÜ119	Flute	3+1	3.0
ESTÜ120	Solfege	3+1	3.0
ESTÜ121	Piano	3+1	3.0
ESTÜ122	Guitar	3+1	3.0
ESTÜ123	Gender Equality in Work Life	2+0	3.0
ESTÜ125	Philosophy of Science	3+0	3.0
ESTÜ127	Diction	1+2	3.0
ESTÜ201	Turkish Sign Language	3+0	3.0
ESTÜ203	Introduction to Sociology	3+0	3.0
ESTÜ301	Science Communication	2+0	3.0
ESTÜ401	Introduction to Professional Life	1+1	2.0
ESTÜ403	Basic Computer Utilization	3+0	4.0
ESTÜ405	Computer Programming	3+0	5.0
FEL102	Introduction to Philosophy	2+0	2.5
FEL401	Philosophy of Science	2+0	2.5
FOT202	Photography	2+0	3.0
FRA255 (Fra)	French I	3+0	4.0
FRA256 (Fra)	French II	3+0	4.0
HUK458	Industrial Rights and Technological Development	3+0	3.0
İLT201	Interpersonal Communication	3+0	4.5
İLT419	Body Language and Diction	2+0	5.0
iSN309	Mass Media	3+0	3.0
iSP151 (Spa)	Spanish I	4+0	4.0
iSP152 (Spa)	Spanish II	4+0	4.0
iŞL201	Business Organization	3+0	4.0
iŞL301	Human Resources Management	3+0	4.0
iŞL321	Applied Entrepreneurship	3+1	5.0
iŞL454	Management of Technology	3+0	4.5
iŞL475	Techno-Entrepreneurship	3+0	4.0
İTA255 (İta)	Italian I	3+0	4.0
İTA256 (İta)	Italian II	3+0	4.0
JAP301 (Jap)	Japanese I	4+0	4.0
JAP302 (Jap)	Japanese II	4+0	4.0
KÜL451	History of Science and Engineering	3+0	4.5
MUH151	Introduction to Accounting	3+0	4.5
MÜH402	Engineering Ethics	2+0	3.0
MÜH404	Innovation Management	3+0	3.0
MÜZ101	Evolution of Music	2+0	3.0
MÜZ151	Short History of Music	2+0	3.0
MÜZ157	Traditional Turkish Art Music	2+0	2.0
PSİ102	Psychology	3+0	3.5
PSİ301	Industrial Psychology	3+0	4.5
PZL302	Marketing Management	3+0	4.5
RUS255 (Rus)	Russian I	3+0	4.0
RUS256 (Rus)	Russian II	3+0	4.0
SAN155	Hall Dances	0+2	2.0
SNT155	History of Art	2+0	2.0
SOS153	Sociology	3+0	3.5
SOS154	Man and Sociology	2+0	3.0
SOS155	Folkdance	2+0	2.0
TAR201	History of Science	2+0	2.5
THU203	Community Services	0+2	3.0
TİY121	Introduction to Theatre	2+0	3.0
TİY152	Theatre	2+0	2.5
TİY308	Republic Era Turkish Theatre	2+0	3.0

Area Elective Courses

BİM222 (Eng)	Internet Programming	3+0	4.5
BİM224 (Eng)	Object-Oriented Programming	3+0	5.5
BİM312 (Eng)	Database Management Systems	3+0	6.0
BİM445 (Eng)	Enterprise IT Architecture	2+0	3.0
EEM322 (Eng)	Electronics II	3+0	5.0

EEM334 (Eng)	Digital Systems II	3+0	5.0
EEM403 (Eng)	Fundamentals of Optoelectronics and Nanophotonics	3+0	5.0
EEM407 (Eng)	Digital VLSI Design	2+2	5.0
EEM409 (Eng)	Random Signals	3+0	5.0
EEM417 (Eng)	Engineering Computations	3+1	5.0
EEM418 (Eng)	Introduction to Digital Integrated Circuits	3+0	5.0
EEM444 (Eng)	Object Oriented Design	3+0	5.0
EEM446 (Eng)	Cryptographic Hardware Design	3+0	5.0
EEM447 (Eng)	Research in Digital Systems I	1+4	5.0
EEM448 (Eng)	Research in Digital Systems II	1+4	5.0
EEM449 (Eng)	Embedded System Design	2+2	5.0
EEM450 (Eng)	Introduction to System Identification	3+0	5.0
EEM451 (Eng)	Industrial Control Systems	1+4	5.0
EEM452 (Eng)	Introduction to Robotics	3+0	5.0
EEM453 (Eng)	Research in Control and System Theory I	1+4	5.0
EEM454 (Eng)	Research in Control and System Theory II	1+4	5.0
EEM455 (Eng)	Research in Power Systems I	1+4	5.0
EEM456 (Eng)	Research in Power Systems II	1+4	5.0
EEM457 (Eng)	Research in Signal Processing I	1+4	5.0
EEM458 (Eng)	Research in Signal Processing II	1+4	5.0
EEM459 (Eng)	Research in Electronics I	1+4	5.0
EEM460 (Eng)	Research in Electronics II	1+4	5.0
EEM461 (Eng)	Research in Telecommunications I	1+4	5.0
EEM462 (Eng)	Research in Telecommunications II	1+4	5.0
EEM463 (Eng)	Introduction to Image Processing	3+0	5.0
EEM464 (Eng)	System-on-Chip Design	2+2	5.0
EEM465 (Eng)	Fundamentals of Data Communications	3+0	5.0
EEM466 (Eng)	High Voltage Techniques	3+0	5.0
EEM467 (Eng)	Digital Communications	3+0	5.0
EEM468 (Eng)	Advanced Communication Techniques	3+0	5.0
EEM469 (Eng)	Communication Electronics	3+0	5.0
EEM470 (Eng)	Microwaves and Antennas	3+0	5.0
EEM471 (Eng)	Electrical Machinery I	2+2	5.0
EEM472 (Eng)	Electrical Machinery II	2+2	5.0
EEM473 (Eng)	Power Systems Analysis I	3+0	5.0
EEM475 (Eng)	Power Electronics I	3+0	5.0
EEM476 (Eng)	Power Electronics II	2+2	5.0
EEM477 (Eng)	Digital Signal Processing	3+0	5.0
EEM478 (Eng)	Digital Signal Processing Hardware	1+4	5.0
EEM479 (Eng)	Electrical Installation Systems	2+2	5.0
EEM480 (Eng)	Algorithms and Complexity	3+0	5.0
EEM481 (Eng)	Solid State Electronics	3+0	5.0
EEM482 (Eng)	Fundamentals of Data Networks	3+0	5.0
EEM483 (Eng)	Power Systems Analysis II	2+2	5.0
EEM484 (Eng)	Integrated Circuit Design	3+0	5.0
EEM485 (Eng)	Digital Electronic Circuits	3+0	5.0
EEM486 (Eng)	Computer Architecture	3+0	5.0
EEM489 (Eng)	Microprocessors II	2+2	5.0
EEM490 (Eng)	Nonlinear Systems	3+0	5.0
EEM491 (Eng)	Linear Control Systems	3+0	5.0
EEM493 (Eng)	Digital Control Systems	3+0	5.0
EEM494 (Eng)	Control Systems Laboratory	1+4	5.0
EEM495 (Eng)	Network Synthesis	3+0	5.0
EEM496 (Eng)	Communications Systems Laboratory	1+4	5.0
EEM497 (Eng)	Communication Systems I	3+0	5.0
EEM498 (Eng)	Communication Systems II	3+0	5.0
NÜM301 (Eng)	Numerical Methods	3+0	3.5

AUTONOMOUS VEHICLES TECHNOLOGY MINOR PROGRAM

DEPARTMENT OF INDUSTRIAL ENGINEERING (30% ENGLISH)

Nowadays, technical improvement takes an important role in progressing country. It is important to efficiency use together machine, man and money with ergonomic circumstance. Industrial Engineering aims optimum yield by planning resource and effectiveness. Industrial engineering is concerned with the design, improvement, and installation of integrated systems of people, materials, and equipment; drawing upon specialized knowledge and skill in the mathematics, physical, and social sciences together with the principles and methods of engineering analysis and design, to specify, predict and evaluate the results to be obtained from such systems. Areas like Enterprises Resource Planning, ISO 9001 Quality Management System, fizibilite analysis are related to Industrial Engineering. Anadolu University, Industrial Engineering Department was established in 2002. One professor, three assistant professors, three teaching assistants, six research assistants and two visiting teaching assistants are working in the department. The decisions related with the department are made by the department council which is composed of all faculty members of the department. The research projects are supported with Anadolu University Scientific Research Project Commission. The capacity of the department is 40 students per year for undergraduate program. Students must attend English preparatory class before beginning their four-year Industrial Engineering education. Advanced computer facilities are offered to the students. They can manage production planning, inventory control, work force planning, management etc. with computer based system design. Industrial Engineering Department supports the computer-based education in theory and application.

Department Head : Prof.Dr. Gürkan ÖZTÜRK
 Deputy Department Head : Assoc. Prof.Dr. Haluk YAPICIOĞLU
 Deputy Department Head : Dr. Lecturer Mehmet ALEGÖZ

PROGRAM

I.Semester				II.Semester			
ENM102 (Eng)	Introduction to Industrial Engineering	2+0	3.0	ENM104 (Eng)	Introduction to Computation and Programming for Industrial Engineering	2+2	4.5
FİZ105	Physics I	4+0	6.0	FİZ106	Physics II	4+0	6.0
FİZ107	Physics Laboratory I	0+2	1.5	FİZ108	Physics Laboratory II	0+2	1.5
KİM113 (Eng)	General Chemistry	4+0	6.0	İKT151	Economics	3+0	3.0
KİM115 (Eng)	General Chemistry Laboratory	0+2	1.5	İŞL116 (Eng)	Fundamentals of Business	3+0	3.0
MAT805	Calculus I	4+2	7.5	MAT251 (Eng)	Linear Algebra	3+0	4.5
TRS127	Technical Drawing	2+2	4.5	MAT806	Calculus II	4+2	7.5
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			30.0				30.0
III.Semester				IV.Semester			
ENM203 (Eng)	Linear Programming	2+2	5.5	ENM212 (Eng)	Integer Programming and Network Models	2+2	6.0
ENM207 (Eng)	Advanced Programming	2+2	4.5	ENM214	Manufacturing Methods and Material Selection	3+2	5.0
İSG401	Occupational Health and Safety I	2+0	2.0	ENM407 (Eng)	Systems Analysis	3+0	5.0
MAT219	Differential Equations	2+2	4.5	İSG402	Occupational Health and Safety II	2+0	2.0
MEK215 (Eng)	Statics and Strength of Materials	3+0	4.5	İST244	Engineering Probability	3+0	5.0
MUH210	General and Cost Accounting	3+0	3.0	TAR166	Atatürk's Principles and History of Turkish Revolution II	2+0	2.0
TAR165	Atatürk's Principles and History of Turkish Revolution I	2+0	2.0	TÜR126	Turkish Language II	2+0	2.0
TÜR125	Turkish Language I	2+0	2.0		<i>Seçmeli Dersler</i>	--	3.0
	<i>Seçmeli Dersler</i>	--	2.0				
			----				----
			30.0				30.0
V.Semester				VI.Semester			

BİL409 (Eng)	Decision Support Systems	3+0	6.0	ENM307 (Eng)	Simulation	2+2	6.0
ENM301	Work Study	3+0	4.0	ENM310	Experiment Design and Regression Analysis	3+0	4.5
ENM317	Engineering Statistics	3+0	4.5	ENM320 (Eng)	Production and Operations Planning II	3+0	5.0
ENM319 (Eng)	Production and Operations Planning I	3+0	5.0	ENM426 (Eng)	Ergonomics	3+0	4.5
İKT356 (Eng)	Engineering Economics	3+0	4.5	<i>Mesleki Seçmeli Dersler</i>		--	10.0
	<i>Mesleki Seçmeli Dersler</i>	--	6.0				
			-----				-----
			30.0				30.0

VII.Semester

ENM427	Special Topics in Industrial Engineering	1+2	5.0	ENM428	Industrial Engineering Applications	2+4	8.0
ENM435	Engineering Seminars I	0+2	1.0	<i>Mesleki Seçmeli Dersler</i>		--	22.0
HUK252	Labor Law	2+0	2.5				
TKY302	Quality Control	3+0	4.5				
	<i>Mesleki Seçmeli Dersler</i>	--	14.0				
	<i>Seçmeli Dersler</i>	--	3.0				
			-----				-----
			30.0				30.0

VIII.Semester

Elective Courses

ALM255 (Ger)	German I					3+0	4.0
ALM256 (Ger)	German II					3+0	4.0
ALM357 (Ger)	German III					3+0	4.0
ALM358 (Ger)	German IV					3+0	4.5
ARK108	Archaeology					2+0	2.0
BEÖ155	Physical Education					2+0	2.0
ESTÜ101	Introduction to University Life					0+1	2.0
ESTÜ102 (Eng)	Negotiation Techniques Class					2+0	3.0
ESTÜ103	Ceramic Design Processes					2+1	3.0
ESTÜ104	Academic and Life Skills					2+1	3.0
ESTÜ106	Proje Yönetimi					2+1	3.0
ESTÜ111	Volunteering Works					1+2	4.0
ESTÜ112	Cyber Security for Everyone					2+0	2.0
ESTÜ113	Design Thinking					3+0	3.0
ESTÜ114	Visual Thinking					3+0	3.0
ESTÜ115	Photographic Viewpoint					2+1	3.0
ESTÜ116	Computer Aided Design I					3+0	3.0
ESTÜ117	Computer Aided Design II					3+0	3.0
ESTÜ118	Visual Thinking with Concepts					3+0	3.0
ESTÜ119	Flute					3+1	3.0
ESTÜ120	Solfege					3+1	3.0
ESTÜ121	Piano					3+1	3.0
ESTÜ122	Guitar					3+1	3.0
ESTÜ123	Gender Equality in Work Life					2+0	3.0
ESTÜ125	Philosophy of Science					3+0	3.0
ESTÜ127	Diction					1+2	3.0
ESTÜ201	Turkish Sign Language					3+0	3.0
ESTÜ203	Introduction to Sociology					3+0	3.0
ESTÜ301	Science Communication					2+0	3.0
ESTÜ401	Introduction to Professional Life					1+1	2.0
ESTÜ403	Basic Computer Utilization					3+0	4.0
ESTÜ405	Computer Programming					3+0	5.0
FOT202	Photography					2+0	3.0
FRA255 (Fra)	French I					3+0	4.0
FRA256 (Fra)	French II					3+0	4.0

İLT201	Interpersonal Communication	3+0	4.5
İLT419	Body Language and Diction	2+0	5.0
iSP151 (Spa)	Spanish I	4+0	4.0
iSP152 (Spa)	Spanish II	4+0	4.0
iŞL321	Applied Entrepreneurship	3+1	5.0
İTA255 (İta)	Italian I	3+0	4.0
İTA256 (İta)	Italian II	3+0	4.0
JAP301 (Jap)	Japanese I	4+0	4.0
JAP302 (Jap)	Japanese II	4+0	4.0
MÜH402	Engineering Ethics	2+0	3.0
MÜH404	Innovation Management	3+0	3.0
MÜZ151	Short History of Music	2+0	3.0
MÜZ155	Turkish Folk Music	2+0	2.0
MÜZ157	Traditional Turkish Art Music	2+0	2.0
PSİ102	Psychology	3+0	3.5
RUS255 (Rus)	Russian I	3+0	4.0
RUS256 (Rus)	Russian II	3+0	4.0
SAN155	Hall Dances	0+2	2.0
SNT155	History of Art	2+0	2.0
SOS155	Folkdance	2+0	2.0
THU203	Community Services	0+2	3.0
TİY121	Introduction to Theatre	2+0	3.0
TİY152	Theatre	2+0	2.5
TİY308	Republic Era Turkish Theatre	2+0	3.0

Area Elective Courses

ARY202	Research Techniques	3+0	5.0
BiM211 (Eng)	Visual Programming	2+2	6.0
BiM213 (Eng)	Data Structures and Algorithms	2+2	5.5
BiM222 (Eng)	Internet Programming	3+0	4.5
BiM312 (Eng)	Database Management Systems	3+0	6.0
BiM445 (Eng)	Enterprise IT Architecture	2+0	3.0
BiM466 (Eng)	Fuzzy Logic	3+0	4.5
BiM470 (Eng)	Neural Networks	3+0	4.5
BiM478 (Eng)	Management Information Systems	3+0	4.5
EEM480 (Eng)	Algorithms and Complexity	3+0	5.0
ENM304 (Eng)	Investment Planning and Analysis	4+0	6.0
ENM306 (Eng)	Stochastic Models	3+0	4.5
ENM309	Industrial Information Systems	3+0	6.0
ENM312	Manufacturing Systems Analysis	3+0	5.0
ENM313	Mathematical Programming Models in Engineering	3+0	4.5
ENM315 (Eng)	Nonlinear Programming	2+2	6.0
ENM411 (Eng)	Facilities Planning	3+0	4.5
ENM411	Facility Planning	3+0	4.5
ENM413 (Eng)	Planning and Scheduling in Manufacturing and Service Systems	3+0	4.0
ENM413	Planning and Scheduling in Manufacturing and Service Systems	3+0	4.0
ENM415 (Eng)	Design, Creativity and Innovation	3+0	4.5
ENM419 (Eng)	Sustainable Systems Engineering	3+0	5.0
ENM420	Service Systems	3+0	4.5
ENM421	Introduction to Data Science	2+1	4.5
ENM430	Cognitive Ergonomics	3+0	4.5
ENM431	Advanced Production Systems	3+0	4.5
ENM432	Lean Thinking and Lean Manufacturing Management	3+0	4.5
ENM437 (Eng)	Structural Equation Modeling	3+0	4.5
ENM440 (Eng)	Introduction to Data Mining	3+0	4.5
ENM442 (Eng)	Decision Analysis	3+0	4.5
ENM444	Supply Chain Modeling And Analysis	3+0	4.5
ENM446	Enterprise Resource Planning	3+0	4.5
ENM448 (Eng)	Project Planning and Management	3+0	6.0
ENM450 (Eng)	Introduction to Metaheuristic Optimization	3+0	6.0
ENM452 (Eng)	Introduction to Multiobjective Optimization	3+0	5.0
ENM454	Risk Assessment and Hazard Analysis Techniques	3+0	4.5
Fin415 (Eng)	Financial Markets and Institutions	3+0	4.5
iST237	Programming With MATLAB	4+0	4.0
iST401	Multivariate Statistics I	3+0	4.5

İST402	Multivariate Statistics II	3+0	4.0
İST411 (Eng)	Time Series Analysis	4+0	5.0
İST411	Time Series Analysis	4+0	5.0
İST415	Reliability Analysis	3+0	5.0
İŞL301	Human Resources Management	3+0	4.0
İŞL323 (Eng)	Human Resources Management	3+0	5.0
İŞL412	Strategic Management	2+0	3.0
İŞL454 (Eng)	Management of Technology	3+0	4.5
İŞL454	Management of Technology	3+0	4.5
İŞL475	Techno-Entrepreneurship	3+0	4.0
LOJ401 (Eng)	Logistics Management and Models	3+0	6.0
LOJ401	Logistics Management and Models	3+0	6.0
MAT226	Introduction to Graph Theory	3+0	5.0
MAT410	Game Theory	3+0	5.0
MÜH302	Interdisciplinary Applications	1+2	4.5
MÜH302 (Eng)	Interdisciplinary Applications	1+2	4.5
PZL310 (Eng)	Marketing Management	3+0	5.0
PZL452 (Eng)	Revenue Management and Pricing	3+0	6.0
TKY405	Total Quality Management	3+0	4.5

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING MINOR PROGRAM

DEPARTMENT OF INDUSTRIAL ENGINEERING (ENGLISH)

Nowadays, technical improvement takes an important role in progressing country. It is important to efficiency use together machine, man and money with ergonomic circumstance. Industrial Engineering aims optimum yield by planning resource and effectiveness. Industrial engineering is concerned with the design, improvement, and installation of integrated systems of people, materials, and equipment; drawing upon specialized knowledge and skill in the mathematics, physical, and social sciences together with the principles and methods of engineering analysis and design, to specify, predict and evaluate the results to be obtained from such systems. Areas like Enterprises Resource Planning, ISO 9001 Quality Management System, fizibilite analysis are related to Industrial Engineering. Anadolu University, Industrial Engineering Department was established in 2002. One professor, three assistant professors, three teaching assistants, six research assistants and two visiting teaching assistants are working in the department. The decisions related with the department are made by the department council which is composed of all faculty members of the department. The research projects are supported with Anadolu University Scientific Research Project Commission. The capacity of the department is 40 students per year for undergraduate program. Students must attend English preparatory class before beginning their four-year Industrial Engineering education. Advanced computer facilities are offered to the students. They can manage production planning, inventory control, work force planning, management etc. with computer based system design. Industrial Engineering Department supports the computer-based education in theory and application.

Günümüzde teknolojik gelişme ülke kalkınmasında önemli bir rol oynamaktadır. Bu teknolojik gelişmede makine, insan ve para yönetiminin yanı sıra, bu üç faktörün birlikte en verimli ve ergonomik koşullarda kullanılması da büyük önem taşımaktadır. Endüstri Mühendisliği, makine, insan ve para kaynaklarını etkin ve verimli bir şekilde planlayarak optimum çıktıyı elde etmeyi amaçlar. Endüstri Mühendisliği insan, makine ve ekipmanın bütünleşik sistemlerinin tasarımı, gelişmesi ve kurulmasıyla ilgilidir; bu sistemlerden elde edilen sonuçları belirtmek, değerlendirmek, için mühendislik analiz ve tasarım yöntemleriyle birlikte matematik, fizik ve sosyal bilimlerde uzmanlık gösterir. Bütünleşik kaynak planlaması ISO 9001 Kalite Yönetim Sistemleri fizibilite analizleri, gibi konular Endüstri Mühendislerinin ilgilendiği alanlardır. Anadolu Üniversitesi Endüstri Mühendisliği Bölümü 2002 yılında kurulmuştur. 2 Profösör, 2 Doçent, 7 Yardımcı Doçent, 11 Araştırma Görevlisi bulunmaktadır. 2013-2014 Öğretim Yılı'nda 62 öğrenci alınmıştır. Öğrenciler dört yıllık Endüstri Mühendisliği eğitimine başlamadan önce İngilizce hazırlık sınıfı okumak veya İngilizce yeterlilik sınavından geçmek zorundadırlar. Öğrencilere gelişmiş bilgisayar laboratuvar olanakları sunulmaktadır. Bilgisayar laboratuvarları genel amaçlı olmanın yanı sıra Endüstri Mühendisliğine özel yazılımları içeren laboratuvarlar da mevcuttur. Endüstri Mühendisliği'ne özel laboratuvarları da, üretim planlaması, hat dengeleme ve iş gücü planlaması konularını içeren Üretim Modülü, malzeme tedarikini ve stok kontrolünü içeren Malzeme Yönetim Modülü, Satış Dağıtım Modülü, İnsan Kaynakları Modülü, Mali İşler ve Mali Muhasebe Modülü olan SAP R/3 programı, ARENA, MINITAB, SPSS, LINDO, LINGO vb. pek çok yazılımları öğrencilerin kullanabilmesi mümkündür.

Department Head : Prof.Dr. Gürkan ÖZTÜRK
Deputy Department Head : Assoc. Prof.Dr. Haluk YAPICIOĞLU
Deputy Department Head : Dr. Lecturer Mehmet ALEGÖZ

DEPARTMENT OF CIVIL ENGINEERING (30% ENGLISH)

Civil Engineers from history left us the Maya and Egyptian Pyramids, the Gothic Cathedrals, the Great Wall of China, and quite literally, the physical as well as the technological foundation upon which many of our modern structure are built. The scope of the construction industry today is immense: from suburban homes to 100 story skyscraper, from sidewalk to dams and tunnels for irrigation and hydroelectric power; from recreational marinas to complete harbors and even structures in the deep open sea; from bycle shops to aircrafts factories; from smart houses to bridges; thermal power plants, petroleum refineries, and mining developments; highways and rapid train systems that not only span physical spaces, but bring people together in the social, political and economic endovers. The Department was established in 1998 as Civil Engineering Department. The department is located at the İki Eylül Campus and occupies a covered area of 5000 m2. 4 Professors,4 Associate Professors, 6 Assistant Professors and 11 Research Assistants currently working in the department. The decisions related with the department are made by the department council which is composed of all faculty members of the department. The department is governed by one chairman and two deputy chairmen. One of the deputy chairmen takes care of technical activities of the department while the other deputy chairman assists chairman in academic activities in the department.

Department Head : Prof.Dr. Aynur ŞENSOY ŞORMAN
 Deputy Department Head : Dr. Lecturer Onur TUNABOYU
 Deputy Department Head : Prof.Dr. Özgür AVŞAR

PROGRAM

I.Semester				II.Semester			
FİZ105 (Eng)	Physics I	4+0	6.0	FİZ106 (Eng)	Physics II	4+0	6.0
FİZ107 (Eng)	Physics Laboratory I	0+2	1.5	FİZ108 (Eng)	Physics Laboratory II	0+2	1.5
İNG250 (Eng)	Reading and Speaking in English	2+0	2.0	İNG360 (Eng)	English for Business	2+0	2.0
İNŞ101	Introduction to Civil Engineering	2+0	3.5	İNŞ118	Computer Applications in Civil Engineering	2+2	4.5
KİM113	General Chemistry	4+0	6.0	MAT806	Calculus II	4+2	7.5
KİM115	General Chemistry Laboratory	0+2	1.5	TRS110	Technical Drawing in Civil Engineering	2+2	4.5
MAT805	Calculus I	4+2	7.5	TÜR126	Turkish Language II	2+0	2.0
TÜR125	Turkish Language I	2+0	2.0	<i>Seçmeli Dersler</i>		--	2.0
			----				----
			30.0				30.0
III.Semester				IV.Semester			
İNŞ239	Law and Ethics in Civil Engineering	3+0	3.0	İKT356 (Eng)	Engineering Economics	3+0	4.5
İNŞ241 (Eng)	Materials Science in Civil Engineering	3+0	5.0	İNŞ240 (Eng)	Hydrology	3+0	4.5
İST201 (Eng)	Statistics	3+0	3.0	İNŞ246 (Eng)	Computer Programming in Civil Engineering	1+2	3.5
MAT219	Differential Equations	2+2	4.5	MEK206 (Eng)	Dynamics	3+0	4.5
MEK201 (Eng)	Statics	3+0	5.0	MEK212 (Eng)	Strength of Materials I	3+2	6.0
NÜM202	Linear Algebra and Numerical Methods	4+0	4.5	MLZ204	Materials of Construction	3+2	5.0
TAR165	Atatürk's Principles and History of Turkish Revolution I	2+0	2.0	TAR166	Atatürk's Principles and History of Turkish Revolution II	2+0	2.0
	<i>Seçmeli Dersler</i>	--	3.0				
			----				----
			30.0				30.0
V.Semester				VI.Semester			
İNŞ307 (Eng)	Structural Analysis I	3+2	6.0	İNŞ302	Reinforced Concrete I	3+2	6.0
İNŞ311	Transportation Engineering I	3+2	6.0	İNŞ320	Steel Structures	3+0	4.5
İNŞ312 (Eng)	Construction Engineering and Management	3+0	4.5	İNŞ322 (Eng)	Hydraulics	3+2	6.0

İNŞ315 (Eng)	Soil Mechanics I	3+0	4.5	İNŞ342	Foundation Engineering I	3+0	4.5
İNŞ317 (Eng)	Soil Mechanics Laboratory	0+2	1.5		<i>Mesleki Seçmeli Dersler</i>	--	9.0
MEK307	Fluid Mechanics	3+0	4.5				
MEK307 (Eng)	Fluid Mechanics	3+0	4.5				
	<i>Seçmeli Dersler</i>	--	3.0				
			----				----
			30.0				30.0

VII.Semester

İNŞ415	Special Topics in Civil Engineering	2+2	3.0
İNŞ417	Design Project	2+2	4.0
İSG401	Occupational Health and Safety I	2+0	2.0
	<i>Mesleki Seçmeli Dersler</i>	--	18.0
	<i>Seçmeli Dersler</i>	--	3.0

			30.0

VIII.Semester

İNŞ414	Applications of Design in Civil Engineering	2+4	5.5
İSG402	Occupational Health and Safety II	2+0	2.0
	<i>Mesleki Seçmeli Dersler</i>	--	22.5

			30.0

Elective Courses

ALM255 (Ger)	German I	3+0	4.0
ALM256 (Ger)	German II	3+0	4.0
ALM357 (Ger)	German III	3+0	4.0
ALM358 (Ger)	German IV	3+0	4.5
ARK108	Archaeology	2+0	2.0
BEÖ155	Physical Education	2+0	2.0
ESTÜ101	Introduction to University Life	0+1	2.0
ESTÜ103	Ceramic Design Processes	2+1	3.0
ESTÜ104	Academic and Life Skills	2+1	3.0
ESTÜ106	Proje Yönetimi	2+1	3.0
ESTÜ111	Volunteering Works	1+2	4.0
ESTÜ112	Cyber Security for Everyone	2+0	2.0
ESTÜ113	Design Thinking	3+0	3.0
ESTÜ114	Visual Thinking	3+0	3.0
ESTÜ115	Photographic Viewpoint	2+1	3.0
ESTÜ116	Computer Aided Design I	3+0	3.0
ESTÜ117	Computer Aided Design II	3+0	3.0
ESTÜ118	Visual Thinking with Concepts	3+0	3.0
ESTÜ119	Flute	3+1	3.0
ESTÜ120	Solfege	3+1	3.0
ESTÜ121	Piano	3+1	3.0
ESTÜ122	Guitar	3+1	3.0
ESTÜ123	Gender Equality in Work Life	2+0	3.0
ESTÜ125	Philosophy of Science	3+0	3.0
ESTÜ127	Diction	1+2	3.0
ESTÜ201	Turkish Sign Language	3+0	3.0
ESTÜ203	Introduction to Sociology	3+0	3.0
ESTÜ301	Science Communication	2+0	3.0
ESTÜ401	Introduction to Professional Life	1+1	2.0
ESTÜ403	Basic Computer Utilization	3+0	4.0
ESTÜ405	Computer Programming	3+0	5.0
FOT202	Photography	2+0	3.0
FRA255 (Fra)	French I	3+0	4.0
FRA256 (Fra)	French II	3+0	4.0
HUK252	Labor Law	2+0	2.5
HUK458	Industrial Rights and Technological Development	3+0	3.0
İKT151	Economics	3+0	3.0
İLT201 (Eng)	Interpersonal Communication	3+0	4.5
İLT419	Body Language and Diction	2+0	5.0

iSN309	Mass Media	3+0	3.0
iSP151 (Spa)	Spanish I	4+0	4.0
iSP152 (Spa)	Spanish II	4+0	4.0
iŞL101 (Eng)	Introduction to Business	3+0	4.5
iŞL321	Applied Entrepreneurship	3+1	5.0
iŞL454 (Eng)	Management of Technology	3+0	4.5
iŞL475	Techno-Entrepreneurship	3+0	4.0
iTA255 (İta)	Italian I	3+0	4.0
iTA256 (İta)	Italian II	3+0	4.0
JAP301 (Jap)	Japanese I	4+0	4.0
JAP302 (Jap)	Japanese II	4+0	4.0
KÜL451 (Eng)	History of Science and Engineering	3+0	4.5
MÜH402 (Eng)	Engineering Ethics	2+0	3.0
MÜH404 (Eng)	Innovation Management	3+0	3.0
MÜZ101	Evolution of Music	2+0	3.0
MÜZ151	Short History of Music	2+0	3.0
MÜZ157	Traditional Turkish Art Music	2+0	2.0
PSİ102	Psychology	3+0	3.5
RUS255 (Rus)	Russian I	3+0	4.0
RUS256 (Rus)	Russian II	3+0	4.0
SNT155	History of Art	2+0	2.0
SOS154	Man and Sociology	2+0	3.0
THU203	Community Services	0+2	3.0
TİY121	Introduction to Theatre	2+0	3.0
TİY152	Theatre	2+0	2.5
TİY308	Republic Era Turkish Theatre	2+0	3.0

Area Elective Courses

iNŞ310	Water Supply and Sewerage	3+2	4.5
iNŞ314 (Eng)	Structural Analysis II	3+0	4.5
iNŞ401	Reinforced Concrete Project	3+0	4.5
iNŞ407	Reinforced Concrete II	3+0	4.5
iNŞ409	Pavement Design	3+0	4.5
iNŞ411	Transportation Engineering II	3+0	4.5
iNŞ451 (Eng)	Geographic Information Systems (GIS) Applications in Hydrology and Hydraulics	2+2	4.5
iNŞ452 (Eng)	Computer Applications in Hydrology and Hydraulics	2+2	4.5
iNŞ453	Railway Engineering	3+0	4.5
iNŞ454	Earthquake Analysis of Structures	3+0	4.5
iNŞ455	Highway Design	2+2	4.5
iNŞ456	Ground Water Hydrology	3+0	4.5
iNŞ457	Construction Cost Design	2+2	4.5
iNŞ458	Testing of Concrete	3+0	4.5
iNŞ459	Geotechnical Design	2+2	4.5
iNŞ460	Admixture for Concrete	3+0	4.5
iNŞ461	Structural Design for Reinforced Concrete Buildings	2+2	4.5
iNŞ462	Properties of Fresh and Hardened Concrete	3+0	4.5
iNŞ463	Hydraulic Design	2+2	4.5
iNŞ464	Concrete Durability	3+0	4.5
iNŞ465	Steel Structural Design	2+2	4.5
iNŞ466 (Eng)	Stell Structure Project	3+0	4.5
iNŞ467 (Eng)	Construction Equipments	3+0	4.5
iNŞ468	Computer-Based Project Management	3+0	4.5
iNŞ469 (Eng)	Renewable Energy with Water, Wind and Wave Power	3+0	4.5
iNŞ470	Concrete Technology	3+0	4.5
iNŞ471 (Eng)	Numerical Modeling in Hydrology and Hydraulics	2+2	4.5
iNŞ472	Introduction to Traffic	3+0	4.5
iNŞ473	Timber Structures	3+0	4.5
iNŞ474	Tunnels	3+0	4.5
iNŞ475	Multi-Story Steel Structure Design	3+0	4.5
iNŞ476	Project Planning with Primavera and MS Project	3+0	4.5
iNŞ478	Construction Cost Analysis and Estimating	3+0	4.5
iNŞ480	Concrete Making Materials	3+0	4.5
iNŞ481	Soil Mechanics II	3+0	4.5

iNŞ482	Ground Improvement	3+0	4.5
iNŞ483	Retaining Structures	3+0	4.5
iNŞ484	Foundation Engineering II	3+0	4.5
iNŞ485	Irrigation and Drainage	3+0	4.5
iNŞ486	Introduction to Soil Dynamics	3+0	4.5
iNŞ487	Water Structures	3+0	4.5
iNŞ488	Environmental Geotechnology	3+0	4.5
iNŞ489 (Eng)	Open Channel Hydraulics	3+0	4.5
iNŞ490	Coastal and Port Engineering	3+0	4.5
iNŞ492	Water Resources Engineering	3+0	4.5
iNŞ492 (Eng)	Water Resources Engineering	3+0	4.5
iNŞ494	Civil Engineering Construction	3+0	4.5
iNŞ495	Highway Pavements	3+0	4.5
iNŞ496 (Eng)	Construction Planning and Management	3+0	4.5
iNŞ498 (Eng)	Introduction to Structural Dynamics	3+0	4.5
JEO201	Engineering Geology	3+0	4.5
MEK403 (Eng)	Strength of Materials II	3+0	4.5
MÜH302	Interdisciplinary Applications	1+2	4.5
TOP102	Surveying	2+2	4.5

DEPARTMENT OF CIVIL ENGINEERING (ENGLISH)

Civil Engineers from history left us the Maya and Egyptian Pyramids, the Gothic Cathedrals, the Great Wall of China, and quite literally, the physical as well as the technological foundation upon which many of our modern structure are built. The scope of the construction industry today is immense: from suburban homes to 100 story skyscraper, from sidewalk to dams and tunnels for irrigation and hydroelectric power; from recreational marinas to complete harbors and even structures in the deep open sea; from bicycle shops to aircrafts factories; from smart houses to bridges; thermal power plants, petroleum refineries, and mining developments; highways and rapid train systems that not only span physical spaces, but bring people together in the social, political and economic endovers. The Department was established in 1998 as Civil Engineering Department. The department is located at the İki Eylül Campus and occupies a covered area of 5000 m². 4 Professors, 4 Associate Professors, 6 Assistant Professors and 11 Research Assistants currently working in the department. The decisions related with the department are made by the department council which is composed of all faculty members of the department. The department is governed by one chairman and two deputy chairmen. One of the deputy chairmen takes care of technical activities of the department while the other deputy chairman assists chairman in academic activities in the department.

Department Head	: Prof.Dr. Aynur ŞENSOY ŞORMAN
Deputy Department Head	: Dr. Lecturer Onur TUNABOYU
Deputy Department Head	: Prof.Dr. Özgür AVŞAR

PROGRAM

I.Semester				II.Semester			
FİZ105 (Eng)	Physics I	4+0	6.0	FİZ106 (Eng)	Physics II	4+0	6.0
FİZ107 (Eng)	Physics Laboratory I	0+2	1.5	FİZ108 (Eng)	Physics Laboratory II	0+2	1.5
iNG250 (Eng)	Reading and Speaking in English	2+0	2.0	iNG360 (Eng)	English for Business	2+0	2.0
iNŞ101 (Eng)	Introduction to Civil Engineering	2+0	3.5	iNŞ118	Computer Applications in Civil Engineering	2+2	4.5
KİM113 (Eng)	General Chemistry	4+0	6.0	MAT806 (Eng)	Calculus II	4+2	7.5
KİM115 (Eng)	General Chemistry Laboratory	0+2	1.5	TRS110 (Eng)	Technical Drawing in Civil Engineering	2+2	4.5
MAT805 (Eng)	Calculus I	4+2	7.5	TÜR126	Turkish Language II	2+0	2.0
TÜR125	Turkish Language I	2+0	2.0	<i>Seçmeli Dersler</i>	--	2.0	
			----				----
			30.0				30.0
III.Semester				IV.Semester			
iNŞ239 (Eng)	Law and Ethics in Civil Engineering	3+0	3.0	İKT356 (Eng)	Engineering Economics	3+0	4.5

İNŞ241 (Eng)	Materials Science in Civil Engineering	3+0	5.0	İNŞ240 (Eng)	Hydrology	3+0	4.5
iST201 (Eng)	Statistics	3+0	3.0	İNŞ246 (Eng)	Computer Programming in Civil Engineering Dynamics	1+2	3.5
MAT219 (Eng)	Differential Equations	2+2	4.5	MEK206 (Eng)		3+0	4.5
MEK201 (Eng)	Statics	3+0	5.0	MEK212 (Eng)	Strength of Materials I	3+2	6.0
NÜM202 (Eng)	Linear Algebra and Numerical Methods	4+0	4.5	MLZ204 (Eng)	Materials of Construction	3+2	5.0
TAR165	Atatürk's Principles and History of Turkish Revolution I	2+0	2.0	TAR166	Atatürk's Principles and History of Turkish Revolution II	2+0	2.0
	<i>Seçmeli Dersler</i>	--	3.0				
			----				----
			30.0				30.0

V.Semester

İNŞ307 (Eng)	Structural Analysis I	3+2	6.0
İNŞ311 (Eng)	Transportation Engineering I	3+2	6.0
İNŞ312 (Eng)	Construction Engineering and Management	3+0	4.5
İNŞ315 (Eng)	Soil Mechanics I	3+0	4.5
İNŞ317 (Eng)	Soil Mechanics Laboratory	0+2	1.5
MEK307 (Eng)	Fluid Mechanics	3+0	4.5
	<i>Seçmeli Dersler</i>	--	3.0

			30.0

VI.Semester

İNŞ302 (Eng)	Reinforced Concrete I	3+2	6.0
İNŞ320 (Eng)	Steel Structures	3+0	4.5
İNŞ322 (Eng)	Hydraulics	3+2	6.0
İNŞ342 (Eng)	Foundation Engineering I	3+0	4.5
	<i>Mesleki Seçmeli Dersler</i>	--	9.0

			30.0

VII.Semester

İNŞ415 (Eng)	Special Topics in Civil Engineering	2+2	3.0
İNŞ417 (Eng)	Design Project	2+2	4.0
iSG401	Occupational Health and Safety I	2+0	2.0
	<i>Mesleki Seçmeli Dersler</i>	--	18.0
	<i>Seçmeli Dersler</i>	--	3.0

			30.0

VIII.Semester

İNŞ414 (Eng)	Applications of Design in Civil Engineering	2+4	5.5
iSG402	Occupational Health and Safety II	2+0	2.0
	<i>Mesleki Seçmeli Dersler</i>	--	22.5

			30.0

Elective Courses

ALM255 (Ger)	German I	3+0	4.0
ALM256 (Ger)	German II	3+0	4.0
ALM357 (Ger)	German III	3+0	4.0
ALM358 (Ger)	German IV	3+0	4.5
ARK108	Archaeology	2+0	2.0
BEÖ155	Physical Education	2+0	2.0
ESTÜ101	Introduction to University Life	0+1	2.0
ESTÜ102 (Eng)	Negotiation Techniques Class	2+0	3.0
ESTÜ103	Ceramic Design Processes	2+1	3.0
ESTÜ104	Academic and Life Skills	2+1	3.0
ESTÜ106	Proje Yönetimi	2+1	3.0
ESTÜ111	Volunteering Works	1+2	4.0
ESTÜ112	Cyber Security for Everyone	2+0	2.0
ESTÜ113	Design Thinking	3+0	3.0

ESTÜ114	Visual Thinking	3+0	3.0
ESTÜ115	Photographic Viewpoint	2+1	3.0
ESTÜ116	Computer Aided Design I	3+0	3.0
ESTÜ117	Computer Aided Design II	3+0	3.0
ESTÜ118	Visual Thinking with Concepts	3+0	3.0
ESTÜ119	Flute	3+1	3.0
ESTÜ120	Solfege	3+1	3.0
ESTÜ121	Piano	3+1	3.0
ESTÜ122	Guitar	3+1	3.0
ESTÜ123	Gender Equality in Work Life	2+0	3.0
ESTÜ125	Philosophy of Science	3+0	3.0
ESTÜ127	Diction	1+2	3.0
ESTÜ201	Turkish Sign Language	3+0	3.0
ESTÜ203	Introduction to Sociology	3+0	3.0
ESTÜ301	Science Communication	2+0	3.0
ESTÜ401	Introduction to Professional Life	1+1	2.0
ESTÜ403	Basic Computer Utilization	3+0	4.0
ESTÜ405	Computer Programming	3+0	5.0
FOT202	Photography	2+0	3.0
FRA255 (Fra)	French I	3+0	4.0
FRA256 (Fra)	French II	3+0	4.0
HUK252	Labor Law	2+0	2.5
HUK458	Industrial Rights and Technological Development	3+0	3.0
iKT151 (Eng)	Economics	3+0	3.0
iLT201 (Eng)	Interpersonal Communication	3+0	4.5
iLT419	Body Language and Diction	2+0	5.0
iSN309	Mass Media	3+0	3.0
iSP151 (Spa)	Spanish I	4+0	4.0
iSP152 (Spa)	Spanish II	4+0	4.0
iŞL101 (Eng)	Introduction to Business	3+0	4.5
iŞL321	Applied Entrepreneurship	3+1	5.0
iŞL454 (Eng)	Management of Technology	3+0	4.5
iŞL475	Techno-Entrepreneurship	3+0	4.0
iTA255 (İta)	Italian I	3+0	4.0
iTA256 (İta)	Italian II	3+0	4.0
JAP301 (Jap)	Japanese I	4+0	4.0
JAP302 (Jap)	Japanese II	4+0	4.0
KÜL451 (Eng)	History of Science and Engineering	3+0	4.5
MÜH402 (Eng)	Engineering Ethics	2+0	3.0
MÜH404 (Eng)	Innovation Management	3+0	3.0
MÜZ101	Evolution of Music	2+0	3.0
MÜZ151	Short History of Music	2+0	3.0
MÜZ157	Traditional Turkish Art Music	2+0	2.0
PSİ102	Psychology	3+0	3.5
RUS255 (Rus)	Russian I	3+0	4.0
RUS256 (Rus)	Russian II	3+0	4.0
SNT155	History of Art	2+0	2.0
SOS154	Man and Sociology	2+0	3.0
THU203	Community Services	0+2	3.0
TİY121	Introduction to Theatre	2+0	3.0
TİY152	Theatre	2+0	2.5
TİY308	Republic Era Turkish Theatre	2+0	3.0

Area Elective Courses

iNŞ310 (Eng)	Water Supply and Sewerage	3+2	4.5
iNŞ314 (Eng)	Structural Analysis II	3+0	4.5
iNŞ401 (Eng)	Reinforced Concrete Project	3+0	4.5
iNŞ407 (Eng)	Reinforced Concrete II	3+0	4.5
iNŞ409 (Eng)	Pavement Design	3+0	4.5
iNŞ411 (Eng)	Transportation Engineering II	3+0	4.5
iNŞ451 (Eng)	Geographic Information Systems (GIS) Applications in Hydrology and Hydraulics	2+2	4.5
iNŞ452 (Eng)	Computer Applications in Hydrology and Hydraulics	2+2	4.5
iNŞ453 (Eng)	Railway Engineering	3+0	4.5
iNŞ454 (Eng)	Earthquake Analysis of Structures	3+0	4.5

iNŞ455 (Eng)	Highway Design	2+2	4.5
iNŞ456 (Eng)	Ground Water Hydrology	3+0	4.5
iNŞ457 (Eng)	Construction Cost Design	2+2	4.5
iNŞ458 (Eng)	Testing of Concrete	3+0	4.5
iNŞ459 (Eng)	Geotechnical Design	2+2	4.5
iNŞ460 (Eng)	Admixture for Concrete	3+0	4.5
iNŞ461 (Eng)	Structural Design for Reinforced Concrete Buildings	2+2	4.5
iNŞ462 (Eng)	Properties of Fresh and Hardened Concrete	3+0	4.5
iNŞ463 (Eng)	Hydraulic Design	2+2	4.5
iNŞ464 (Eng)	Concrete Durability	3+0	4.5
iNŞ465 (Eng)	Steel Structural Design	2+2	4.5
iNŞ466 (Eng)	Stell Structure Project	3+0	4.5
iNŞ467 (Eng)	Construction Equipments	3+0	4.5
iNŞ468 (Eng)	Computer-Based Project Management	3+0	4.5
iNŞ469 (Eng)	Renewable Energy with Water, Wind and Wave Power	3+0	4.5
iNŞ470 (Eng)	Concrete Technology	3+0	4.5
iNŞ471 (Eng)	Numerical Modeling in Hydrology and Hydraulics	2+2	4.5
iNŞ472 (Eng)	Introduction Traffic Engineering	3+0	4.5
iNŞ474 (Eng)	Tunnels	3+0	4.5
iNŞ476 (Eng)	Project Planning with Primavera and MS Project	3+0	4.5
iNŞ478 (Eng)	Construction Cost Analysis And Estimating	3+0	4.5
iNŞ480 (Eng)	Concrete Making Materials	3+0	4.5
iNŞ481 (Eng)	Soil Mechanics II	3+0	4.5
iNŞ482 (Eng)	Ground Improvement	3+0	4.5
iNŞ483 (Eng)	Retaining Structures	3+0	4.5
iNŞ484 (Eng)	Foundation Engineering II	3+0	4.5
iNŞ485 (Eng)	Irrigation and Drainage	3+0	4.5
iNŞ486 (Eng)	Introduction to Soil Dynamics	3+0	4.5
iNŞ487 (Eng)	Water Structures	3+0	4.5
iNŞ488 (Eng)	Environmental Geotechnology	3+0	4.5
iNŞ489 (Eng)	Open Channel Hydraulics	3+0	4.5
iNŞ490 (Eng)	Coastal and Port Engineering	3+0	4.5
iNŞ492 (Eng)	Water Resources Engineering	3+0	4.5
iNŞ494 (Eng)	Construction in Civil Engineering	3+0	4.5
iNŞ495 (Eng)	Highway Pavements	3+0	4.5
iNŞ496 (Eng)	Construction Planning and Management	3+0	4.5
iNŞ498 (Eng)	Introduction to Structural Dynamics	3+0	4.5
JEO201 (Eng)	Engineering Geology	3+0	4.5
MEK403 (Eng)	Strength of Materials II	3+0	4.5
MÜH302 (Eng)	Interdisciplinary Applications	1+2	4.5
TOP102 (Eng)	Surveying	2+2	4.5

DEPARTMENT OF CHEMICAL ENGINEERING (30% ENGLISH)

Chemical Engineering involves in the design, construction and operation of processes which convert raw materials into useful products by changing their chemical or physical state. The discipline of chemical engineering has its origins in oil refining and petrochemical production, moreover the skills of a chemical engineer are now applied in a wide range of other industries, such as food and baverage, pharmaceuticals, paper, plastics, water purification, electricity generation, metals, textiles, fertelizer, cement, semi-conductors, perfumes and fragrances, cosmetics and detergents,paint,fertilizer and cement. The department was established in 1968. The department transferreed to Eskisehir Osmangazi Universty with the partition of Anadolu Universty in 1993 and after 4 years break,it restarted education again at Anadolu Universty Iki Eylul Campus in 1997. Based the data of 2016-2017 Academical Year,427 students have still been getting Chemical Engineering education which is provided by 4 Professors, 1 Associate Professor, 8 Assistant Professors and 9 Research Assistants.Quota per year is 70 students.% 30 of education language is English.

Department Head : Prof.Dr. Nezihe AYAS
Deputy Department Head : Assoc. Prof.Dr. Elif ÖDEŞ AKBAY
Deputy Department Head : Dr. Lecturer Emir Zafer HOŞGÜN

PROGRAM

I.Semester

II.Semester

FİZ105	Physics I	4+0	6.0	FİZ106	Physics II	4+0	6.0
FİZ107	Physics Laboratory I	0+2	1.5	FİZ108	Physics Laboratory II	0+2	1.5
KİM117 (Eng)	General Chemistry I	4+0	6.0	KİM115 (Eng)	General Chemistry Laboratory	0+2	1.5
KMH105 (Eng)	Technical English	2+0	2.5	KİM118 (Eng)	General Chemistry II	4+0	6.0
MAT805	Calculus I	4+2	7.5	KMH108 (Eng)	Introduction to Chemical Engineering	2+0	3.5
TRS127	Technical Drawing	2+2	4.5	MAT806	Calculus II	4+2	7.5
TÜR125	Turkish Language I	2+0	2.0	TÜR126	Turkish Language II <i>Seçmeli Dersler</i>	2+0	2.0
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			30.0				30.0

III.Semester

BİL813 (Eng)	Computer Programming in Engineering	2+2	4.5
İKT151 (Eng)	Economics	3+0	3.0
KİM208	Organic Chemistry	3+0	4.0
KİM211	Analytical Chemistry	3+0	3.0
KİM230	Analytical Chemistry Laboratory	0+3	3.0
KMH213 (Eng)	Chemical Process Calculations	3+2	6.0
MAT219	Differential Equations	2+2	4.5
TAR165	Atatürk's Principles and History of Turkish Revolution I	2+0	2.0

			30.0

IV.Semester

İST201	Statistics	3+0	3.0
KİM226	Physical Chemistry	3+0	4.0
KİM231	Physical Chemistry Laboratory	0+3	3.0
MEK317	Fluid Mechanics	4+0	5.0
NÜM202 (Eng)	Linear Algebra and Numerical Methods	4+0	4.5
TAR166	Atatürk's Principles and History of Turkish Revolution II <i>Mesleki Seçmeli Dersler</i>	2+0	2.0

			30.0

V.Semester

İKT356 (Eng)	Engineering Economics	3+0	4.5
KMH310	Heat Transfer	4+0	5.0
KMH317	Chemical Engineering Thermodynamics I	3+0	4.5
MLZ203	Materials Science	3+0	3.5
	<i>Mesleki Seçmeli Dersler</i>	--	9.5
	<i>Seçmeli Dersler</i>	--	3.0

			30.0

VI.Semester

KMH303 (Eng)	Mathematical Modeling in Chemical Engineering	4+0	5.0
KMH308	Mass Transfer	4+0	5.0
KMH314 (Eng)	Chemical Reaction Engineering I	4+0	5.0
KMH318	Chemical Engineering Thermodynamics II <i>Mesleki Seçmeli Dersler</i>	3+0	4.5
	<i>Seçmeli Dersler</i>	--	4.5

			30.0

VII.Semester

İSG401	Occupational Health and Safety I	2+0	2.0
KMH415	Process Dynamics and Control	4+0	5.0
KMH425 (Eng)	Chemical Reaction Engineering II	4+0	5.0
KMH429	Special Topics in Chemical Engineering	1+2	3.0
KMH431 (Eng)	Chemical Engineering Design I	4+0	6.0
KMH435	Chemical Engineering Laboratory I <i>Mesleki Seçmeli Dersler</i>	0+4	5.0
		--	4.0

VIII.Semester

İSG402	Occupational Health and Safety II	2+0	2.0
KMH406 (Eng)	Separation Processes	3+0	5.0
KMH432 (Eng)	Chemical Engineering Design II	4+0	6.0
KMH434	Chemical Engineering Applications	2+4	7.0
KMH436	Chemical Engineering Laboratory II <i>Mesleki Seçmeli Dersler</i>	0+4	5.0
		--	5.0

30.0-----
30.0**Elective Courses**

ALM255 (Ger)	German I	3+0	4.0
ALM256 (Ger)	German II	3+0	4.0
ALM357 (Ger)	German III	3+0	4.0
ALM358 (Ger)	German IV	3+0	4.5
ARK108	Archaeology	2+0	2.0
BEÖ155	Physical Education	2+0	2.0
ESTÜ101	Introduction to University Life	0+1	2.0
ESTÜ103	Ceramic Design Processes	2+1	3.0
ESTÜ104	Academic and Life Skills	2+1	3.0
ESTÜ105	Big Data Analysis with SQL	2+2	4.5
ESTÜ106	Proje Yönetimi	2+1	3.0
ESTÜ111	Volunteering Works	1+2	4.0
ESTÜ112	Cyber Security for Everyone	2+0	2.0
ESTÜ113	Design Thinking	3+0	3.0
ESTÜ114	Visual Thinking	3+0	3.0
ESTÜ115	Photographic Viewpoint	2+1	3.0
ESTÜ116	Computer Aided Design I	3+0	3.0
ESTÜ117	Computer Aided Design II	3+0	3.0
ESTÜ118	Visual Thinking with Concepts	3+0	3.0
ESTÜ119	Flute	3+1	3.0
ESTÜ120	Solfege	3+1	3.0
ESTÜ121	Piano	3+1	3.0
ESTÜ122	Guitar	3+1	3.0
ESTÜ123	Gender Equality in Work Life	2+0	3.0
ESTÜ125	Philosophy of Science	3+0	3.0
ESTÜ127	Diction	1+2	3.0
ESTÜ201	Turkish Sign Language	3+0	3.0
ESTÜ203	Introduction to Sociology	3+0	3.0
ESTÜ301	Science Communication	2+0	3.0
ESTÜ401	Introduction to Professional Life	1+1	2.0
ESTÜ403	Basic Computer Utilization	3+0	4.0
ESTÜ405	Computer Programming	3+0	5.0
FOT202	Photography	2+0	3.0
FRA255 (Fra)	French I	3+0	4.0
FRA256 (Fra)	French II	3+0	4.0
HUK252	Labor Law	2+0	2.5
HUK458	Industrial Rights and Technological Development	3+0	3.0
İKT427	Industrial Economics	2+0	3.0
İLT201	Interpersonal Communication	3+0	4.5
İLT419	Body Language and Diction	2+0	5.0
İSN309	Mass Media	3+0	3.0
İSP151 (Spa)	Spanish I	4+0	4.0
İSP152 (Spa)	Spanish II	4+0	4.0
İŞL101 (Eng)	Introduction to Business	3+0	4.5
İŞL201 (Eng)	Business Organization	3+0	4.0
İŞL321	Applied Entrepreneurship	3+1	5.0
İŞL454 (Eng)	Management of Technology	3+0	4.5
İTA255 (İta)	Italian I	3+0	4.0
İTA256 (İta)	Italian II	3+0	4.0
JAP301 (Jap)	Japanese I	4+0	4.0
JAP302 (Jap)	Japanese II	4+0	4.0
KÜL451 (Eng)	History of Science and Engineering	3+0	4.5
MÜH402 (Eng)	Engineering Ethics	2+0	3.0
MÜH404 (Eng)	Innovation Management	3+0	3.0
MÜZ151	Short History of Music	2+0	3.0
MÜZ157	Traditional Turkish Art Music	2+0	2.0
PSİ102	Psychology	3+0	3.5
PZL211 (Eng)	Principles of Marketing	3+0	5.0
PZL302	Marketing Management	3+0	4.5

RUS255 (Rus)	Russian I	3+0	4.0
RUS256 (Rus)	Russian II	3+0	4.0
SNT155	History of Art	2+0	2.0
SOS154	Man and Sociology	2+0	3.0
THU203	Community Services	0+2	3.0
TiY121	Introduction to Theatre	2+0	3.0
TiY152	Theatre	2+0	2.5
TiY308	Republic Era Turkish Theatre	2+0	3.0

Area Elective Courses

KİM282	Organic Chemistry Laboratory	0+3	3.0
KİM457	Chemical Technologies I	3+0	4.0
KİM458	Chemical Technologies II	3+0	4.0
KMH210	Instrumental Analysis	3+0	3.0
KMH212	Computer Applications in Chemical Engineering	3+0	4.0
KMH307	Experimental Design Techniques	3+0	4.0
KMH313	Biorefinery Processes	3+0	4.0
KMH316 (Eng)	Biotechnology	3+0	4.0
KMH319	Fundamentals of Polymer Chemistry	3+0	4.0
KMH320	Paint Technology	3+0	4.0
KMH323	Biochemical Engineering Fundamentals	3+0	4.0
KMH326	Introduction to Pharmaceutical Technology	3+0	4.0
KMH351	Sugar Technology	3+0	4.0
KMH352	Water Technology	3+0	4.0
KMH353	Air Pollution Removal Equipments	3+0	4.0
KMH354	Boron Technology	3+0	4.0
KMH355	Food Chemistry	3+0	4.0
KMH356	Bubble Column Technology	3+0	4.0
KMH357	Electrochemistry	3+0	4.0
KMH358	Measurement and Control in Chemical Processes	3+0	4.0
KMH360 (Eng)	Carbon Materials	3+0	4.0
KMH407	Fuel and Energy Technologies	3+0	4.0
KMH409	Oil Technology	3+0	4.0
KMH410	Coal Technologies	3+0	4.0
KMH411	Polymer Technology	3+0	4.0
KMH412	Petroleum Refinery Engineering	3+0	4.0
KMH433	Industrial Equipments in Chemical Engineering	3+0	4.0
KMH437 (Eng)	Alcohol Based Fuels	3+0	4.0
KMH438 (Eng)	Computer Aided Design in Chemical Engineering	3+0	4.0
KMH439 (Eng)	Catalytic Materials	3+0	4.0
KMH440 (Eng)	Polymer Materials Science	3+0	4.0
KMH441 (Eng)	Catalysis	3+0	4.0
KMH442 (Eng)	Textile Chemical Processing	3+0	4.0
KMH451	Phase Equilibrium	3+0	4.0
KMH452	Food Processing	3+0	4.0
KMH453	Operations of Solid Particles	3+0	4.0
KMH454	Heat Transfer Equipments	3+0	4.0
KMH455	Food Additives	3+0	4.0
KMH456	Occupational Health and Safety	3+0	4.0
KMH457 (Eng)	Transport Phenomena	3+0	4.0
KMH458	Chemical Process Optimization	3+0	4.0
KMH459 (Eng)	Geopolymer Production and Applications	3+0	4.0
KMH460	Membrane Separation Processes	3+0	4.0
KMH462 (Eng)	Membrane Science and Technology	3+0	4.0
KMH464	Chemical Admixtures for Concrete Production	3+0	4.0
MÜH302	Interdisciplinary Applications	1+2	4.5
MÜH302 (Eng)	Interdisciplinary Applications	1+2	4.5

SUSTAINABLE CLEAN ENERGY MINOR PROGRAM

DEPARTMENT OF CHEMICAL ENGINEERING (ENGLISH)

Chemical Engineering involves in the design, construction and operation of processes which convert raw materials into useful products by changing their chemical or physical state. The discipline of chemical engineering has its origins in oil refining and petrochemical production, moreover the skills of a chemical engineer are now applied in a wide range of other industries, such as food and beverage, pharmaceuticals, paper, plastics, water purification, electricity generation, metals, textiles, fertilizer, cement, semi-conductors, perfumes and fragrances, cosmetics and detergents, paint, fertilizer and cement. % 100 of education language is English.

Department Head : Prof.Dr. Nezihe AYAS
 Deputy Department Head : Assoc. Prof.Dr. Elif ÖDEŞ AKBAY
 Deputy Department Head : Dr. Lecturer Emir Zafer HOŞGÜN

PROGRAM

I.Semester				II.Semester			
FİZ105 (Eng)	Physics I	4+0	6.0	FİZ106 (Eng)	Physics II	4+0	6.0
FİZ107 (Eng)	Physics Laboratory I	0+2	1.5	FİZ108 (Eng)	Physics Laboratory II	0+2	1.5
KİM117 (Eng)	General Chemistry I	4+0	6.0	KİM115 (Eng)	General Chemistry Laboratory	0+2	1.5
KMH105 (Eng)	Technical English	2+0	2.5	KİM118 (Eng)	General Chemistry II	4+0	6.0
MAT805 (Eng)	Calculus I	4+2	7.5	KMH108 (Eng)	Introduction to Chemical Engineering	2+0	3.5
TRS127 (Eng)	Technical Drawing	2+2	4.5	MAT806 (Eng)	Calculus II	4+2	7.5
TÜR125	Turkish Language I	2+0	2.0	TÜR126	Turkish Language II <i>Seçmeli Dersler</i>	2+0	2.0
			----			--	2.0
			30.0				30.0
III.Semester				IV.Semester			
BİL813 (Eng)	Computer Programming in Engineering	2+2	4.5	İST201 (Eng)	Statistics	3+0	3.0
İKT151 (Eng)	Economics	3+0	3.0	KİM226 (Eng)	Physical Chemistry	3+0	4.0
KİM208 (Eng)	Organic Chemistry	3+0	4.0	KİM231 (Eng)	Physical Chemistry Laboratory	0+3	3.0
KİM211 (Eng)	Analytical Chemistry	3+0	3.0	MEK317 (Eng)	Fluid Mechanics	4+0	5.0
KİM230 (Eng)	Analytical Chemistry Laboratory	0+3	3.0	NÜM202 (Eng)	Linear Algebra and Numerical Methods	4+0	4.5
KMH213 (Eng)	Chemical Process Calculations	3+2	6.0	TAR166	Atatürk's Principles and History of Turkish Revolution II <i>Mesleki Seçmeli Dersler</i>	2+0	2.0
MAT219 (Eng)	Differential Equations	2+2	4.5			--	8.5
TAR165	Atatürk's Principles and History of Turkish Revolution I	2+0	2.0				
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			30.0				30.0
V.Semester				VI.Semester			
İKT356 (Eng)	Engineering Economics	3+0	4.5	KMH303 (Eng)	Mathematical Modeling in Chemical Engineering	4+0	5.0
KMH310 (Eng)	Heat Transfer	4+0	5.0	KMH308 (Eng)	Mass Transfer	4+0	5.0
KMH317 (Eng)	Chemical Engineering Thermodynamics I	3+0	4.5	KMH314 (Eng)	Chemical Reaction Engineering I	4+0	5.0
MLZ203 (Eng)	Materials Science	3+0	3.5	KMH318 (Eng)	Chemical Engineering Thermodynamics II (Kimya)	3+0	4.5

<i>Mesleki Seçmeli Dersler</i>	--	9.5
<i>Seçmeli Dersler</i>	--	3.0

		30.0

Mühendisliği Termodinamiği II)		
<i>Mesleki Seçmeli Dersler</i>	--	4.5
<i>Seçmeli Dersler</i>	--	6.0

		30.0

VII.Semester

iSG401	Occupational Health and Safety I	2+0	2.0
KMH415 (Eng)	Process Dynamics and Control	4+0	5.0
KMH425 (Eng)	Chemical Reaction Engineering II	4+0	5.0
KMH429 (Eng)	Special Topics in Chemical Engineering	1+2	3.0
KMH431 (Eng)	Chemical Engineering Design I	4+0	6.0
KMH435 (Eng)	Chemical Engineering Laboratory I	0+4	5.0
	<i>Mesleki Seçmeli Dersler</i>	--	4.0

			30.0

VIII.Semester

iSG402	Occupational Health and Safety II	2+0	2.0
KMH406 (Eng)	Separation Processes	3+0	5.0
KMH432 (Eng)	Chemical Engineering Design II	4+0	6.0
KMH434 (Eng)	Chemical Engineering Applications	2+4	7.0
KMH436 (Eng)	Chemical Engineering Laboratory II	0+4	5.0
	<i>Mesleki Seçmeli Dersler</i>	--	5.0

			30.0

Elective Courses

ALM255 (Ger)	German I	3+0	4.0
ALM256 (Ger)	German II	3+0	4.0
ALM357 (Ger)	German III	3+0	4.0
ALM358 (Ger)	German IV	3+0	4.5
ARK108	Archaeology	2+0	2.0
BEÖ155	Physical Education	2+0	2.0
ESTÜ101	Introduction to University Life	0+1	2.0
ESTÜ102 (Eng)	Negotiation Techniques Class	2+0	3.0
ESTÜ103	Ceramic Design Processes	2+1	3.0
ESTÜ104	Academic and Life Skills	2+1	3.0
ESTÜ106	Proje Yönetimi	2+1	3.0
ESTÜ111	Volunteering Works	1+2	4.0
ESTÜ112	Cyber Security for Everyone	2+0	2.0
ESTÜ113	Design Thinking	3+0	3.0
ESTÜ114	Visual Thinking	3+0	3.0
ESTÜ115	Photographic Viewpoint	2+1	3.0
ESTÜ116	Computer Aided Design I	3+0	3.0
ESTÜ117	Computer Aided Design II	3+0	3.0
ESTÜ118	Visual Thinking with Concepts	3+0	3.0
ESTÜ119	Flute	3+1	3.0
ESTÜ120	Solfege	3+1	3.0
ESTÜ121	Piano	3+1	3.0
ESTÜ122	Guitar	3+1	3.0
ESTÜ401	Introduction to Professional Life	1+1	2.0
FOT202	Photography	2+0	3.0
FRA255 (Fra)	French I	3+0	4.0
FRA256 (Fra)	French II	3+0	4.0
HUK252	Labor Law	2+0	2.5
HUK458	Industrial Rights and Technological Development	3+0	3.0
İKT427	Industrial Economics	2+0	3.0
İLT201	Interpersonal Communication	3+0	4.5
İLT419	Body Language and Diction	2+0	5.0
İSN309	Mass Media	3+0	3.0
İSP151 (Spa)	Spanish I	4+0	4.0
İSP152 (Spa)	Spanish II	4+0	4.0
İŞL101 (Eng)	Introduction to Business	3+0	4.5

işL201 (Eng)	Business Organization	3+0	4.0
işL321	Applied Entrepreneurship	3+1	5.0
işL454 (Eng)	Management of Technology	3+0	4.5
işL475	Techno-Entrepreneurship	3+0	4.0
iTA255 (İta)	Italian I	3+0	4.0
iTA256 (İta)	Italian II	3+0	4.0
JAP301 (Jap)	Japanese I	4+0	4.0
JAP302 (Jap)	Japanese II	4+0	4.0
KÜL451 (Eng)	History of Science and Engineering	3+0	4.5
MÜH402 (Eng)	Engineering Ethics	2+0	3.0
MÜH404 (Eng)	Innovation Management	3+0	3.0
MÜZ151	Short History of Music	2+0	3.0
MÜZ157	Traditional Turkish Art Music	2+0	2.0
PSİ102	Psychology	3+0	3.5
PZL211 (Eng)	Principles of Marketing	3+0	5.0
PZL302	Marketing Management	3+0	4.5
RUS255 (Rus)	Russian I	3+0	4.0
RUS256 (Rus)	Russian II	3+0	4.0
SNT155	History of Art	2+0	2.0
SOS154	Man and Sociology	2+0	3.0
THU203	Community Services	0+2	3.0
TİY121	Introduction to Theatre	2+0	3.0
TİY152	Theatre	2+0	2.5
TİY308	Republic Era Turkish Theatre	2+0	3.0
TÜR120	Turkish Sign Language	3+0	3.0

Area Elective Courses

KMH212 (Eng)	Computer Applications in Chemical Engineering	3+0	4.0
KMH307 (Eng)	Experimental Design Techniques	3+0	4.0
KMH316 (Eng)	Biotechnology	3+0	4.0
KMH357 (Eng)	Electrochemistry	3+0	4.0
KMH358 (Eng)	Measurement and Control in Chemical Processes	3+0	4.0
KMH360 (Eng)	Carbon Materials	3+0	4.0
KMH437 (Eng)	Alcohol Based Fuels	3+0	4.0
KMH438 (Eng)	Computer Aided Design in Chemical Engineering	3+0	4.0
KMH439 (Eng)	Catalytic Materials	3+0	4.0
KMH440 (Eng)	Polymer Materials Science	3+0	4.0
KMH441 (Eng)	Catalysis	3+0	4.0
KMH442 (Eng)	Textile Chemical Processing	3+0	4.0
KMH457 (Eng)	Transport Phenomena	3+0	4.0
KMH458 (Eng)	Chemical Process Optimization	3+0	4.0
KMH459 (Eng)	Geopolymer Production and Applications	3+0	4.0
KMH462 (Eng)	Membrane Science and Technology	3+0	4.0
MÜH302 (Eng)	Interdisciplinary Applications	1+2	4.5

DEPARTMENT OF MECHANICAL ENGINEERING (30% ENGLISH)

Department Head : Prof.Dr. Oğuz ÇOLAK
Deputy Department Head : Dr. Lecturer Özgür POYRAZ
Deputy Department Head : Dr. Lecturer Yalçın ÖZDEMİR

PROGRAM

I.Semester				II.Semester			
FİZ105 (Eng)	Physics I	4+0	6.0	FİZ106 (Eng)	Physics II	4+0	6.0
FİZ107 (Eng)	Physics Laboratory I	0+2	1.5	FİZ108 (Eng)	Physics Laboratory II	0+2	1.5
KİM113 (Eng)	General Chemistry	4+0	6.0	MAT806	Calculus II	4+2	7.5
MAT805	Calculus I	4+2	7.5	MKM102 (Eng)	Introduction to Mechanical Engineering	3+0	6.0

MKM101	Technical Drawing for Mechanical Engineers	2+2	5.0	MKM104	Computer Aided Engineering Technical Drawing	2+2	5.0
MKM103 (Eng)	Technical English for Mechanical Engineers	2+0	2.0	TÜR126	Turkish Language II	2+0	2.0
TÜR125	Turkish Language I	2+0	2.0		<i>Seçmeli Dersler</i>	--	2.0
			----				----
			30.0				30.0

III.Semester

BİL200 (Eng)	Computer Programming	2+2	6.0
İKT356 (Eng)	Engineering Economics	3+0	4.5
İST201 (Eng)	Statistics	3+0	3.0
MAT219	Differential Equations	2+2	4.5
MEK217 (Eng)	Engineering Mechanics: Statics	3+0	5.0
TAR165	Atatürk's Principles and History of Turkish Revolution I	2+0	2.0
TER207 (Eng)	Thermodynamics I	3+0	5.0

			30.0

IV.Semester

EEM214 (Eng)	Electrical Engineering for Mechanical Engineers	3+0	3.5
MEK216 (Eng)	Engineering Mechanics: Dynamics	3+0	4.0
MLZ232 (Eng)	Introduction to Materials Science	3+0	3.5
NÜM202 (Eng)	Linear Algebra and Numerical Methods	4+0	4.5
TAR166	Atatürk's Principles and History of Turkish Revolution II	2+0	2.0
TER208 (Eng)	Thermodynamics II	3+0	5.0
	<i>Mesleki Seçmeli Dersler</i>	--	4.5
	<i>Seçmeli Dersler</i>	--	3.0

			30.0

V.Semester

MEK311 (Eng)	Strength of Materials	4+0	6.0
MEK323 (Eng)	Fundamentals of Fluid Mechanics	4+0	6.5
MKM301 (Eng)	Theory of Machines	3+0	7.0
MKM305	Introduction to Finite Element Analysis	3+0	3.5
	<i>Mesleki Seçmeli Dersler</i>	--	4.0
	<i>Seçmeli Dersler</i>	--	3.0

			30.0

VI.Semester

EEM310 (Eng)	Control Systems	3+0	7.0
MKM302 (Eng)	Machine Design I	4+0	6.0
MKM303 (Eng)	Heat Transfer	4+0	5.0
MKM304 (Eng)	Manufacturing Techniques	2+2	5.0
MKM306 (Eng)	Experimental Engineering	2+2	4.0
	<i>Seçmeli Dersler</i>	--	3.0

			30.0

VII.Semester

İSG401	Occupational Health and Safety I	2+0	2.0
MKM401 (Eng)	Machine Design II	4+0	6.0
MKM403	Mechanical Engineering Design I	2+2	5.0
	<i>Mesleki Seçmeli Dersler</i>	--	13.0
	<i>Seçmeli Dersler</i>	--	4.0

			30.0

VIII.Semester

İSG402	Occupational Health and Safety II	2+0	2.0
MKM404	Mechanical Engineering Design II	2+4	5.0
	<i>Mesleki Seçmeli Dersler</i>	--	19.0
	<i>Seçmeli Dersler</i>	--	4.0

			30.0

Elective Courses

ALM255 (Ger)	German I			3+0	4.0
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ALM256 (Ger)	German II	3+0	4.0
ALM357 (Ger)	German III	3+0	4.0
ALM358 (Ger)	German IV	3+0	4.5
BEÖ155	Physical Education	2+0	2.0
ESTÜ101	Introduction to University Life	0+1	2.0
ESTÜ103	Ceramic Design Processes	2+1	3.0
ESTÜ104	Academic and Life Skills	2+1	3.0
ESTÜ106	Proje Yönetimi	2+1	3.0
ESTÜ111	Volunteering Works	1+2	4.0
ESTÜ112	Cyber Security for Everyone	2+0	2.0
ESTÜ113	Design Thinking	3+0	3.0
ESTÜ114	Visual Thinking	3+0	3.0
ESTÜ115	Photographic Viewpoint	2+1	3.0
ESTÜ116	Computer Aided Design I	3+0	3.0
ESTÜ117	Computer Aided Design II	3+0	3.0
ESTÜ118	Visual Thinking with Concepts	3+0	3.0
ESTÜ119	Flute	3+1	3.0
ESTÜ120	Solfege	3+1	3.0
ESTÜ121	Piano	3+1	3.0
ESTÜ122	Guitar	3+1	3.0
ESTÜ123	Gender Equality in Work Life	2+0	3.0
ESTÜ125	Philosophy of Science	3+0	3.0
ESTÜ127	Diction	1+2	3.0
ESTÜ201	Turkish Sign Language	3+0	3.0
ESTÜ203	Introduction to Sociology	3+0	3.0
ESTÜ301	Science Communication	2+0	3.0
ESTÜ401	Introduction to Professional Life	1+1	2.0
ESTÜ403	Basic Computer Utilization	3+0	4.0
ESTÜ405	Computer Programming	3+0	5.0
FOT202	Photography	2+0	3.0
FRA255 (Fra)	French I	3+0	4.0
FRA256 (Fra)	French II	3+0	4.0
HUK252	Labor Law	2+0	2.5
HUK458	Industrial Rights and Technological Development	3+0	3.0
İKT209 (Eng)	Money and Banking	3+0	5.0
İLT201	Interpersonal Communication	3+0	4.5
İLT419	Body Language and Diction	2+0	5.0
İSN309	Mass Media	3+0	3.0
iSP151 (Spa)	Spanish I	4+0	4.0
iSP152 (Spa)	Spanish II	4+0	4.0
iŞL101 (Eng)	Introduction to Business	3+0	4.5
iŞL103 (Eng)	Business Management	3+0	3.5
iŞL201 (Eng)	Business Organization	3+0	4.0
iŞL302 (Eng)	Production Management and Systems	3+0	4.5
iŞL321	Applied Entrepreneurship	3+1	5.0
iŞL454 (Eng)	Management of Technology	3+0	4.5
iŞL475	Techno-Entrepreneurship	3+0	4.0
İTA255 (İta)	Italian I	3+0	4.0
İTA256 (İta)	Italian II	3+0	4.0
JAP301 (Jap)	Japanese I	4+0	4.0
JAP302 (Jap)	Japanese II	4+0	4.0
MÜH402 (Eng)	Engineering Ethics	2+0	3.0
MÜH404 (Eng)	Innovation Management	3+0	3.0
MÜZ151	Short History of Music	2+0	3.0
MÜZ157	Traditional Turkish Art Music	2+0	2.0
PSİ102	Psychology	3+0	3.5
PZL211 (Eng)	Principles of Marketing	3+0	5.0
PZL302	Marketing Management	3+0	4.5
RUS255 (Rus)	Russian I	3+0	4.0
RUS256 (Rus)	Russian II	3+0	4.0
SNT155	History of Art	2+0	2.0
SOS154	Man and Sociology	2+0	3.0
THU203	Community Services	0+2	3.0
TİY121	Introduction to Theatre	2+0	3.0

TIY152	Theatre	2+0	2.5
TIY308	Republic Era Turkish Theatre	2+0	3.0
TOP102	Surveying	2+2	4.5

Area Elective Courses

EEM311 (Eng)	Principles of Energy Conversion	3+2	7.0
EEM471 (Eng)	Electrical Machinery I	2+2	5.0
EEM472 (Eng)	Electrical Machinery II	2+2	5.0
EEM490 (Eng)	Nonlinear Systems	3+0	5.0
EEM491 (Eng)	Linear Control Systems	3+0	5.0
EEM493 (Eng)	Digital Control Systems	3+0	5.0
EEM494 (Eng)	Control Systems Laboratory	1+4	5.0
iNŞ453	Railway Engineering	3+0	4.5
iNŞ467 (Eng)	Construction Equipments	3+0	4.5
iNŞ469 (Eng)	Renewable Energy with Water, Wind and Wave Power	3+0	4.5
MEK404 (Eng)	Applied Fluid Mechanics	2+2	5.0
MEK405 (Eng)	Applied Strength of Materials	3+0	5.0
MEK406 (Eng)	Mechanical Vibrations	3+0	5.0
MEK439 (Eng)	Thermal System Design	2+2	5.0
MKM220	Problem Solving Methods	3+0	4.5
MKM307	Engineering Materials for Mechanical Engineers	3+0	5.0
MKM339 (Eng)	Introduction to Finite Element Method	2+2	5.0
MKM405	Machining and Machine Tools	3+0	5.0
MKM406	Reliability in Machine Design	3+0	5.0
MKM407	Maintenance in Mechanical Engineering	3+0	5.0
MKM408	Non-destructive Testing Methods	3+0	5.0
MKM409	Shape Memory Alloys	3+0	5.0
MKM410	Aircraft Engine Design	3+0	5.0
MKM411	System Engineering Fundamentals	3+0	5.0
MKM412	Internal Combustion Engines	3+0	5.0
MKM413	Engineering Applications of Finite Element Analysis	3+0	5.0
MKM414	Refrigeration Systems	3+0	5.0
MKM416	Theory of Elasticity	3+0	5.0
MKM417	Nonconventional Manufacturing Techniques	3+0	5.0
MKM418	Materials Handling Techniques	3+0	5.0
MKM419	Mechanics of Materials II	3+0	5.0
MKM420	Manufacturing Quality	3+0	5.0
MKM421	Energy Management and Efficiency	3+0	5.0
MKM422 (Eng)	Micro/ Nanoscale Fabrication and Characterization	3+0	5.0
MKM437 (Eng)	Engineering Materials	3+0	5.0
MKM440	Introduction to Computer Aided Manufacturing	3+0	5.0
MKM440 (Eng)	Introduction to Computer Aided Manufacturing	2+2	5.0
MLZ307 (Eng)	Phase Diagrams	3+0	4.5
MLZ314 (Eng)	Transport Phenomena in Materials Processing	4+0	6.0
MLZ318 (Eng)	Metallic Materials	4+0	4.0
MLZ413 (Eng)	Powder Metallurgy	3+0	4.0
MLZ431 (Eng)	Alloys	3+0	4.0
MLZ433 (Eng)	Thin Film Technology	3+0	4.0
MLZ434 (Eng)	Aviation Materials	3+0	4.0
MLZ444 (Eng)	Welding Technologies	3+0	4.0
MLZ445 (Eng)	Phase Transformations in Metals and Alloys	3+0	4.0
MLZ450 (Eng)	Computational Materials Science	3+0	4.0
MLZ454 (Eng)	Smart Materials	3+0	4.0
MLZ456 (Eng)	Physical Properties of Nanomaterials	3+0	4.0
MTR301 (Eng)	Introduction to Mechatronics	3+0	5.0
MTR401 (Eng)	Mechatronics	2+2	5.0

MECHATRONICS MINOR PROGRAM

ENGINE TECHNOLOGIES MINOR PROGRAM

DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING (ENGLISH)

Materials Science and Engineering is an interdisciplinary field of science that studies ceramic, metallic, polymeric and composite materials and is strongly interrelated with the basic sciences of physics, chemistry and biology as well as chemical and mechanical engineering. The courses offered in the Materials Science and Engineering program especially emphasize the microstructure-property-performance relationships as well as factors that affect the materials behaviour in service. Materials are critical to all fields of engineering since design is often constrained by their limited availability. Furthermore, innovations in materials may lead to new design criteria and result in emergence of new products. Thus, most programs within the Faculty of Engineering involve one or two courses on Materials Science and Engineering. In spite of the fact that the metals and their alloys still constitute the most widely used family of engineering materials, improvements and developments in ceramic, polymer and composite materials are being achieved at an increasing rate. The department was established in 1993 as Ceramic Engineering Department then in 2002 the curriculum was extended and its name was changed to Department of Materials Science & Engineering. The department is located at the İki Eylül Campus and occupies a covered area of 5000 m². 7 Professors, 4 Associate Professors, 5 Assistant Professors and 10 Assistants and 3 Technical personal are currently working in the department. There are 24 PhD students who are registered at Industrial PhD Scholarship Program which aims to educate students who are familiar to industry and willing to carry on their carrier in industry. The department is governed by the head of department and two deputy head of department, one of whom takes care of technical activities of the department while the other assists the head of department in academic activities of the department.

Department Head : Prof.Dr. Aydın DOĞAN
Deputy Department Head : Dr. Lecturer Umut SAVACI

PROGRAM

I.Semester				II.Semester			
FİZ105 (Eng)	Physics I	4+0	6.0	FİZ106 (Eng)	Physics II	4+0	6.0
FİZ107 (Eng)	Physics Laboratory I	0+2	1.5	FİZ108 (Eng)	Physics Laboratory II	0+2	1.5
KİM117 (Eng)	General Chemistry I	4+0	6.0	KİM115 (Eng)	General Chemistry Laboratory	0+2	1.5
MAT805 (Eng)	Calculus I	4+2	7.5	KİM118 (Eng)	General Chemistry II	4+0	6.0
MLZ109 (Eng)	Materials World	2+0	2.5	MAT806 (Eng)	Calculus II	4+2	7.5
TRS127 (Eng)	Technical Drawing	2+2	4.5	MLZ114 (Eng)	Structure of Materials	2+0	2.5
TÜR125	Turkish Language I	2+0	2.0	MLZ116 (Eng)	Freshman Project	1+0	1.0
				TÜR126	Turkish Language II	2+0	2.0
					<i>Seçmeli Dersler</i>	--	2.0
			-----				-----
			30.0				30.0
III.Semester				IV.Semester			
İST255 (Eng)	Engineering Statistics	2+0	3.0	BİL814 (Eng)	Computing and Programming	2+2	4.0
MAT219 (Eng)	Differential Equations	2+2	4.5	ETK208 (Eng)	Engineering Ethics	1+0	2.0
MEK215 (Eng)	Statics and Strength of Materials	3+0	4.5	İSG401	Occupational Health and Safety I	2+0	2.0
MLZ221 (Eng)	Physical Properties of Materials	2+0	2.5	MLZ208 (Eng)	Electrical, Magnetic and Optical Properties of Materials	2+0	3.0
MLZ223 (Eng)	Polymer Chemistry (2+0	3.0	MLZ216 (Eng)	Mechanical Behaviour of Materials I	2+0	3.0
MLZ225 (Eng)	Raw Metarials and Unit Operations	2+0	3.0	MLZ218 (Eng)	Ceramic Processing	2+0	3.0
MLZ229 (Eng)	Materials Characterization Techniques I	2+0	3.0	MLZ222 (Eng)	Materials Characterization Techniques Laboratory	0+2	3.0

NÜM202 (Eng)	Linear Algebra and Numerical Methods	4+0	4.5	MLZ230 (Eng)	Materials Characterization Techniques II	2+0	3.5
TAR165	Atatürk's Principles and History of Turkish Revolution I	2+0	2.0	MLZ231 (Eng)	Materials Thermodynamics I	2+1	4.5
				TAR166	Atatürk's Principles and History of Turkish Revolution II	2+0	2.0
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			30.0				30.0

V.Semester

İKT356 (Eng)	Engineering Economics	3+0	4.5
MLZ315 (Eng)	Electrochemistry	1+0	1.5
MLZ327 (Eng)	Mechanical Behaviour of Materials II	2+0	3.0
MLZ329 (Eng)	Materials Thermodynamics II	2+1	4.5
MLZ331 (Eng)	Materials Processing Laboratory I	0+2	4.5
MLZ333 (Eng)	Phase Diagrams	2+0	3.0
MLZ335 (Eng)	Metallic Materials I	2+0	3.0
MLZ337 (Eng)	Transport Phenomena in Materials Processing I	2+0	3.0
MLZ339 (Eng)	Non-Crystalline Materials	2+0	3.0

			30.0

VI.Semester

İLT328 (Eng)	Communication Skills	1+0	1.0
MLZ326 (Eng)	Project Management	1+0	2.0
MLZ328 (Eng)	Materials and Energy Balance	2+0	3.0
MLZ330 (Eng)	Silicate Ceramics	2+0	3.0
MLZ332 (Eng)	Processing of Polymers	2+0	3.0
MLZ336 (Eng)	Metallic Materials II	2+0	3.0
MLZ338 (Eng)	Transport Phenomena in Materials Processing II	2+0	3.0
	<i>Mesleki Seçmeli Dersler</i>	--	6.0
	<i>Seçmeli Dersler</i>	--	6.0

			30.0

VII.Semester

iSG402	Occupational Health and Safety II	2+0	2.0
MLZ447 (Eng)	Materials Processing Laboratory II	0+2	3.0
MLZ449 (Eng)	Innovation and Entrepreneurship	1+0	1.0
MLZ453 (Eng)	Advanced Materials and Composites	2+0	3.0
MLZ455 (Eng)	Heat Treatment	2+0	3.0
MLZ457 (Eng)	Manufacturing with Materials	2+0	3.0
MLZ459 (Eng)	Degradation of Engineering Materials	2+0	3.0
MLZ463 (Eng)	Project Preparation for Material Science and Engineering	1+2	3.0
TKY411 (Eng)	Quality Control	2+0	3.0
	<i>Mesleki Seçmeli Dersler</i>	--	6.0

			30.0

VIII.Semester

MLZ460 (Eng)	Materials Selection and Design	2+2	5.0
MLZ462 (Eng)	Applications in Materials Engineering	2+0	4.0
MLZ464 (Eng)	Project Practice for Material Science and Engineering	2+4	6.0
	<i>Mesleki Seçmeli Dersler</i>	--	12.0
	<i>Seçmeli Dersler</i>	--	3.0

			30.0

Elective Courses

ALM255 (Ger)	German I	3+0	4.0
ALM256 (Ger)	German II	3+0	4.0
ALM357 (Ger)	German III	3+0	4.0

ALM358 (Ger)	German IV	3+0	4.5
ARK108	Archaeology	2+0	2.0
BEÖ155	Physical Education	2+0	2.0
ÇEV462	Computer Aided Engineering Design	3+0	4.5
ESTÜ101	Introduction to University Life	0+1	2.0
ESTÜ102 (Eng)	Negotiation Techniques Class	2+0	3.0
ESTÜ103	Ceramic Design Processes	2+1	3.0
ESTÜ104 (Eng)	Academic and Life Skills	2+1	3.0
ESTÜ106	Proje Yönetimi	2+1	3.0
ESTÜ111	Volunteering Works	1+2	4.0
ESTÜ112	Cyber Security for Everyone	2+0	2.0
ESTÜ113	Design Thinking	3+0	3.0
ESTÜ114	Visual Thinking	3+0	3.0
ESTÜ115	Photographic Viewpoint	2+1	3.0
ESTÜ116	Computer Aided Design I	3+0	3.0
ESTÜ117	Computer Aided Design II	3+0	3.0
ESTÜ118	Visual Thinking with Concepts	3+0	3.0
ESTÜ119	Flute	3+1	3.0
ESTÜ120	Solfege	3+1	3.0
ESTÜ121	Piano	3+1	3.0
ESTÜ122	Guitar	3+1	3.0
ESTÜ123	Gender Equality in Work Life	2+0	3.0
ESTÜ125	Philosophy of Science	3+0	3.0
ESTÜ127	Diction	1+2	3.0
ESTÜ201	Turkish Sign Language	3+0	3.0
ESTÜ301	Science Communication	2+0	3.0
ESTÜ401	Introduction to Professional Life	1+1	2.0
ESTÜ403	Basic Computer Utilization	3+0	4.0
ESTÜ405	Computer Programming	3+0	5.0
FOT202	Photography	2+0	3.0
FRA255 (Fra)	French I	3+0	4.0
FRA256 (Fra)	French II	3+0	4.0
HUK252	Labor Law	2+0	2.5
HUK458	Industrial Rights and Technological Development	3+0	3.0
İKT209 (Eng)	Money and Banking	3+0	5.0
İLT201	Interpersonal Communication	3+0	4.5
İLT419	Body Language and Diction	2+0	5.0
İSN309	Mass Media	3+0	3.0
İSP151 (Spa)	Spanish I	4+0	4.0
İSP152 (Spa)	Spanish II	4+0	4.0
İŞL101 (Eng)	Introduction to Business	3+0	4.5
İŞL103 (Eng)	Business Management	3+0	3.5
İŞL201 (Eng)	Business Organization	3+0	4.0
İŞL302 (Eng)	Production Management and Systems	3+0	4.5
İŞL321	Applied Entrepreneurship	3+1	5.0
İŞL454 (Eng)	Management of Technology	3+0	4.5
İŞL475	Techno-Entrepreneurship	3+0	4.0
İTA255 (İta)	Italian I	3+0	4.0
İTA256 (İta)	Italian II	3+0	4.0
JAP301 (Jap)	Japanese I	4+0	4.0
JAP302 (Jap)	Japanese II	4+0	4.0
MÜH402 (Eng)	Engineering Ethics	2+0	3.0
MÜH404 (Eng)	Innovation Management	3+0	3.0
MÜZ151	Short History of Music	2+0	3.0
MÜZ157	Traditional Turkish Art Music	2+0	2.0
PSİ102	Psychology	3+0	3.5
PZL211 (Eng)	Principles of Marketing	3+0	5.0
PZL302	Marketing Management	3+0	4.5
RUS255 (Rus)	Russian I	3+0	4.0
RUS256 (Rus)	Russian II	3+0	4.0
SNT155	History of Art	2+0	2.0
SOS154	Man and Sociology	2+0	3.0
TİY121	Introduction to Theatre	2+0	3.0
TİY152	Theatre	2+0	2.5

TIY308	Republic Era Turkish Theatre	2+0	3.0
TOP102	Surveying	2+2	4.5

Area Elective Courses

İKT151 (Eng)	Economics	3+0	3.0
MLZ324 (Eng)	Instrumental Analysis	3+0	4.0
MLZ334 (Eng)	Fundamentals of Semiconductors	2+0	3.0
MLZ342 (Eng)	Whitewares	2+0	3.0
MLZ461 (Eng)	Glass Technology	2+0	3.0
MLZ465 (Eng)	Machining Technology of Metals	2+0	3.0
MLZ466 (Eng)	Enamels	2+0	3.0
MLZ467 (Eng)	Particle Size Control Mechanism	2+0	3.0
MLZ468 (Eng)	Rubber and Rubber Technology	2+0	3.0
MLZ469 (Eng)	Alloys	2+0	3.0
MLZ470 (Eng)	Cement and Concrete	2+0	3.0
MLZ471 (Eng)	Nanomaterials and Nanotechnology	2+0	3.0
MLZ472 (Eng)	Biomaterials	2+0	3.0
MLZ473 (Eng)	Carbon Nanomaterials	2+0	3.0
MLZ474 (Eng)	Aviation Materials	2+0	3.0
MLZ475 (Eng)	Polymer Matrix Composites	2+0	3.0
MLZ476 (Eng)	Engineering Materials for Armour Applications	2+0	3.0
MLZ477 (Eng)	Microscopy in Practice	2+0	3.0
MLZ478 (Eng)	Mathematical Relations in Powder Processing	2+0	3.0
MLZ480 (Eng)	Tile and Brick	2+0	3.0
MLZ482 (Eng)	Refractories	2+0	3.0
MLZ484 (Eng)	Glass Ceramics	2+0	3.0
MLZ486 (Eng)	Strengthening Mechanisms in Materials	2+0	3.0
MLZ488 (Eng)	Technical Glasses	2+0	3.0

COURSE CONTENTS

ALM255 (Ger) German I **3+0 4.0**

Greeting Friends; Asking for Someone's Health; Asking for Directions; Asking Where People are From; Making Requests; Asking for Prices; asking for Prices; Asking for Different Kinds of Food and Drink; Formal Sentences Used in Restaurants and Formal Places; Asking For and Telling People about Preferences; Likes and Dislikes; Asking for the Amount of Something and Telling the Amount of Something; Structures Used in Telephone Conversations; Using Appropriate Grammar Forms for the Given Situations.

ALM256 (Ger) German II **3+0 4.0**

Modal verbs: Können, Müssen, Wollen, Dürfen, Sollen, Mögen; Tenses: Simple Present Tense, Future Tense; Nouns and Types of Nouns; Articles; Singular and Plural Forms: Words that are used as Singular or Plural only, Plural Form of the Indefinite Article; Cases of a Noun: Uninflected Case, Accusative, Dative, Possessive Cases; Exercises about these Grammar Points.

ALM357 (Ger) German III **3+0 4.0**

Expressing a Request; Expressing Regret; Accusing Someone and Apologizing, Describing People, Asking about Someone's Health; Serious Illnesses and Learning about Human Body; Getting Surprised; Responding in Misunderstandings; Explaining Someone Something; Requesting Something from Somebody; Giving Opinions about Furniture; Expressing Opinions about Pictures, Clothes and People; Using Appropriate Grammar Forms for the Given Situations.

ALM358 (Ger) German IV **3+0 4.5**

General Review of Noun Cases: Strong and Weak inflection, Mixed inflection, inflection Groups, inflection of the Words Which are not German in Origin; Adjectives: Use of Adjectives, Adjective Phrase, Use of Adjectives Depending on the Verb, Adjectives and Cases of a Noun, Types of Adjectives; Comparing Adjectives: Verbs; Groups of Verbs, Verb Forms, Regular Verbs; Tenses: Present Continuous Tense, Past Perfect Tense, Future Tense, Future Perfect Tense.

ARK108 Archaeology **2+0 2.0**

Definition; Social, cultural and historical role of archaeology; Domain of Archaeology; Age of the World; Production of the Earliest Stone Tools; Scientific Disciplines Relevant to Archaeological Studies; Brief History of Archaeological Excavations; Historical Classification and History of Anatolia: Prehistoric Ages, Historical Ages, Archaeological sites of Anatolia, Archaeological excavations in Anatolia; Archaeological Activities of University.

ARY202 Research Techniques **3+0 5.0**

Science: Definition of science, Scientific research, Technical approaches in scientific research; Research: Stages of a research, Types of research, Data collection techniques in research; Question: Definition of question, Types of question, Question forms in research, Preparation of the forms using computers; Analysis of the results: Evaluation of question forms using computer, Statistical analysis of the research results, Computer output of research results; Report writing; An Application of Research Planning.

BEÖ155 Physical Education 2+0 2.0

Definition of Physical Education and Sports; Aims, Disadvantages of Inactive Life; Various Activities for Physical Education; Recreation; Human Physiology; First Aid; Sports Branches: Definition, Rules and Application; Keep Fit Programs.

BiL200 (Eng) Computer Programming 2+2 6.0

Procedural and Functional Programming Concepts; C Programming Environment and Compilers; Basic C Commands and Variables; Algorithm Flow; Logic Expressions; Functions; Arrays and Pointers; Function I/O Interfaces; Files; Memory Allocation and Data Structures; Advanced Topics. Procedural and Functional Programming Concepts; C Programming Environment and Compilers; Basic C Commands and Variables; Algorithm Flow; Logic Expressions; Functions; Arrays and Pointers; Function I/O Interfaces; Files; Memory Allocation and Data Structures; Advanced Topics.

BiL301 (Eng) Computer Programming in Engineering 2+1 3.5

Fundamentals of Programming; General MATLAB Operations; Commands; Matrix Operations and Vectors in MATLAB; Numerical Solutions with MATLAB: Root finding, Optimization, Interpolation, Integration, Differential Equations; Data Files in MATLAB: Creating, Reading from files, File types; M-files: Creating and using M-file functions; Programming with M-files: Program control commands, Conditional control, Loop control; Graphics; Engineering Applications Using MATLAB. Fundamentals of Programming; General MATLAB Operations; Commands; Matrix Operations and Vectors in MATLAB; Numerical Solutions with MATLAB: Root finding, Optimization, Interpolation, Integration, Differential Equations; Data Files in MATLAB: Creating, Reading from files, File types; M-files: Creating and using M-file functions; Programming with M-files: Program control commands, Conditional control, Loop control; Graphics; Engineering Applications Using MATLAB.

BiL409 (Eng) Decision Support Systems 3+0 6.0

Rational Decision Making and Appropriate Data Support; Components of Decision Support Systems (DSS): Data, Information, Databases, Dbms, Knowledgebase, Data Warehouses, Rulebase/Modelbase; Expert Systems Mechanism and Certainty Factors, System Dynamics and Simulation, Group DSS, Executive Information Systems, User-Interface Components; Designing, Implementation and Evaluation of DSS. Rational Decision Making and Appropriate Data Support; Components of Decision Support Systems (DSS): Data, Information, Databases, Dbms, Knowledgebase, Data Warehouses, Rulebase/Modelbase; Expert Systems Mechanism and Certainty Factors, System Dynamics and Simulation, Group DSS, Executive Information Systems, User-Interface Components; Designing, Implementation and Evaluation of DSS.

BiL486 Computer Applications in Environmental Engineering 2+1 3.0

Frequently used Software in Environmental Engineering; Numerical Solutions to Frequently Encountered Equations and Comparison with Analytical Solutions; Solving Differential Equations and Matrix Operations with Computer Programs; Correlation and Regression; Time Series Analysis; Use of Selected Environmental Modeling Packages: Stream modeling with QUAL2E, Simulation of wastewater treatment operations and processes.

BiL813 (Eng) Computer Programming in Engineering 2+2 4.5

Fundamentals of Programming; General MATLAB Operations; Commands; Matrix Operations and Vectors in MATLAB; Numerical Solutions with MATLAB: Root finding, Optimization, Interpolation, Integration, Differential Equations; Data Files in MATLAB: Creating, Reading from files, File types; M-files: Creating and using M-file functions; Programming with M-files: Program control commands, Conditional control, Loop control; Graphics; Engineering Applications Using MATLAB.

BiL814 (Eng) Computing and Programming 2+2 4.0

Introduction to Computers: Fundamentals of Algorithms, Pseudocode and Flowcharts; Basic Elements of Programming; Branching programs, String and Input, Iteration; Some Simple Numerical Programs; Functions; Scoping and Abstraction; Structured Types; Tuples, Lists and Mutability, Functions as Objects, Dictionaries; Algorithm Design and Numerical Solutions of Some Materials Science and Engineering Problems.

BiM101 (Eng) Computer Programming I 3+2 7.0

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

Algorithms; Flowcharts; Program Coding and Programming with Java: Primitive Data Types and Operations, Selection Statements, Looping Constructs; Basic I/O Operations: Reading from Keyboard; Printing to Screen; Methods; Arrays.

BiM102 (Eng) Computer Programming II 3+0 6.0

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. 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.

BiM122 (Eng) Discrete Computational Structures 3+0 5.0

Fundamentals of Logic; Set Theory and Mathematical Logic; Methods of Proof; Mathematical Induction; Relations; Functions; Cardinality and Countability; The Duality Principles; Homomorphism and Isomorphism; Boolean Algebras; Graph Theory; Trees; Matrix Representations; Introduction to Algebraic Structures; Lattices; Groups: Semigroups, Monoids; Finite State Machines and Languages. Fundamentals of Logic; Set Theory and Mathematical Logic; Methods of Proof; Mathematical Induction; Relations; Functions; Cardinality and Countability; The Duality Principles; Homomorphism and Isomorphism; Boolean Algebras; Graph Theory; Trees; Matrix Representations; Introduction to Algebraic Structures; Lattices; Groups: Semigroups, Monoids; Finite State Machines and Languages.

BiM203 (Eng) Logic Design 4+0 6.0

Digital Systems and Information: Number systems, Arithmetic operations, Base conversions; Gate Circuits and Boolean Equations: Binary logic and gates, Boolean algebra, Standard forms; Circuit Optimization: Cost criteria, Karnaugh maps; Implementation Technology and Logic Design: Design procedure, Mapping; Combinational Functions: Encoder, Decoder, Multiplexer; Arithmetic Functions: Addition, Subtraction, Multiplication, Division, Signed numbers; Storage Elements: Latches, Flip-flops; Sequential Circuit Analysis: State tables, State diagrams, Mealy and Moore models; Sequential Circuit Design; Counters and Registers. Digital Systems and Information: Number systems, Arithmetic operations, Base conversions; Gate Circuits and Boolean Equations: Binary logic and gates, Boolean algebra, Standard forms; Circuit Optimization: Cost criteria, Karnaugh maps; Implementation Technology and Logic Design: Design procedure, Mapping; Combinational Functions: Encoder, Decoder, Multiplexer; Arithmetic Functions: Addition, Subtraction, Multiplication, Division, Signed numbers; Storage Elements: Latches, Flip-flops; Sequential Circuit Analysis: State tables, State diagrams, Mealy and Moore models; Sequential Circuit Design; Counters and Registers.

BiM204 (Eng) Numeric Analysis for Computer Engineers 3+0 3.5

Numeric Analysis in General: Solution of Equations by Iteration, Interpolation, Spline Interpolation, Numeric Integration and Differentiation; Numeric Linear Algebra: Linear Systems, Least Squares Method, Eigenvalue Problems, Tridiagonalization and QR-Factorization; Numeric Analysis for Ordinary Differential Equations and Partial Differential Equations: Methods for First/Higher Order Ordinary Differential Equations, Methods for Elliptic/Hyperbolic/Parabolic Partial Differential Equations.

BiM207 (Eng) Computer Programming III 2+2 6.0

PATH and CLASSPATH Environment Variables; Java Command-line Switches: -classpath, -class, -server, -jar; Version Control Systems: Git, GitHub; Build Tools: Maven, Gradle; Generics: Bounded type parameters, Wildcards; Java Database Connectivity (JDBC): Prepared statements, Transactions; Software Testing: Unit testing (JUnit); JavaFX Graphical User Interface (GUI): Event-driven programming and animations, JavaFX UI controls and multimedia.

BiM208 (Eng) Computer Programming IV 3+0 5.5

Java Garbage Collection Basics; JVM Options for Garbage Collection Tuning: -Xms, -Xmx, -Xms, -XX: (PermSize), -XX: (MaxPermSize); GC Profiling/Monitoring with Java Visual VM; Regular Expressions: Pattern, Matcher; Java Concurrency: Thread object, Thread pools, Executors, Synchronization, Immutable objects; Annotations: Declaring an annotation type, Type annotations and pluggable type systems; Java SE 8 Streams and Lambda Expressions.

BiM209 (Eng) Principles of Software Design and Development 3+0 6.0

Object-Oriented Programming Concepts; Object-Oriented Design Principles; Needs Analysis; Functionality Analysis; Textual Analysis; Domain Analysis; Commonality Analysis; Concepts of High Cohesion and Loose Coupling; UML Diagrams; Class Diagrams; Use-Case Diagrams; Software Architecture; Test-Driven Development; Feature-Driven Development; Writing Test Scenarios; Defensive Programming.

BiM211 (Eng) Visual Programming 2+2 6.0

Basic Structure and Environment of Visual Programming; Basic Tools of Visual Basic Environment; Project: Characteristics and Help System; Form Design; Controls; Menus; Events and Methods; Data Types; Arrays; Functions; Subroutines and Modules; String and Character Operations; Sample Programs with Different Features; Use of Multiple Forms; Use of Files; Sample Programs on Files; Use of Databases; Sample Applications on Databases. Basic Structure and Environment of Visual

Programming; Basic Tools of Visual Basic Environment; Project: Characteristics and Help System; Form Design; Controls; Menus; Events and Methods; Data Types; Arrays; Functions; Subroutines and Modules; String and Character Operations; Sample Programs with Different Features; Use of Multiple Forms; Use of Files; Sample Programs on Files; Use of Databases; Sample Applications on Databases.

BiM213 (Eng) Data Structures and Algorithms 2+2 5.5

Introduction; Classification of Data Structures; Primitive Data Structures; Arrays and Strings; Abstract Data Types; Data Representation; Formula Based and Linked Representation; Stacks; Recursion; Queues; Linked Lists; Circular Linked Lists; Double Linked Lists; Trees; Binary Trees; Traversal Functions on Binary Trees; Representing Lists as Binary Trees; Search Algorithms; Tree Searching; AVL Trees and Searching; Red-Black Trees; B-Trees; Multiway Search Trees. Introduction; Classification of Data Structures; Primitive Data Structures; Arrays and Strings; Abstract Data Types; Data Representation; Formula Based and Linked Representation; Stacks; Recursion; Queues; Linked Lists; Circular Linked Lists; Double Linked Lists; Trees; Binary Trees; Traversal Functions on Binary Trees; Representing Lists as Binary Trees; Search Algorithms; Tree Searching; AVL Trees and Searching; Red-Black Trees; B-Trees; Multiway Search Trees.

BiM222 (Eng) Internet Programming 3+0 4.5

Introduction to Hyper Text Markup Language (HTML 4); Cascading Style Sheets (CSS); Javascript ? Introduction; Javascript - Control Structures; Javascript ? Functions; Javascript ? Arrays; Javascript ? Objects; Dynamic HTML; DHTML - Object Model and Collections; DHTML - Event Model; Introduction to XML; Creating Markup with XML; XML - Document Type Definition (DTD) and Schemas; XML - Document Object Model; XML Path Language; XSL: Extensible Stylesheet Language Transformations (XSLT). Introduction to Hyper Text Markup Language (HTML 4); Cascading Style Sheets (CSS); Javascript ? Introduction; Javascript - Control Structures; Javascript ? Functions; Javascript ? Arrays; Javascript ? Objects; Dynamic HTML; DHTML - Object Model and Collections; DHTML - Event Model; Introduction to XML; Creating Markup with XML; XML - Document Type Definition (DTD) and Schemas; XML - Document Object Model; XML Path Language; XSL: Extensible Stylesheet Language Transformations (XSLT).

BiM224 (Eng) Object-Oriented Programming 3+0 5.5

Introduction to Object Oriented Programming; Principles of Object Oriented Design; Components and Behavior; Software Components; C++ Standard Library; Function Overloading; Function Templates; Encapsulation; Data Abstraction and Classes in C++; Constructors and Destructors; Default and Pure Constructors; Dynamic Memory Allocation; Friend Functions and Friend Classes; Inheritance; Protected Members; Base and Derived Classes; Virtual Functions and Polymorphism; Definition of Polymorphic Behavior; Virtual Destructors; C++ Templates. Introduction to Object Oriented Programming; Principles of Object Oriented Design; Components and Behavior; Software Components; C++ Standard Library; Function Overloading; Function Templates; Encapsulation; Data Abstraction and Classes in C++; Constructors and Destructors; Default and Pure Constructors; Dynamic Memory Allocation; Friend Functions and Friend Classes; Inheritance; Protected Members; Base and Derived Classes; Virtual Functions and Polymorphism; Definition of Polymorphic Behavior; Virtual Destructors; C++ Templates.

BiM302 (Eng) Computer Networks 3+0 4.5

Essentials of ISO Reference Model: Logic of multi-layered network; Fundamentals of Physical Layer: Bit-Rate, Baud-Rate, Modulation, Encoding; Fundamentals of Data Link Layer: Encapsulation, Framing, CDMA/CD; Network Layer Protocols: IPv4 and IPv6, Forwarding, Routing, Multicasting; Transport Layer Protocols: UDP, TCP, SCTP, Flow control, Congestion control, Reliable packet delivery techniques; Application Layer Protocols: HTTP, FTP, SMTP, P2P file sharing protocols. Essentials of ISO Reference Model: Logic of multi-layered network; Fundamentals of Physical Layer: Bit-Rate, Baud-Rate, Modulation, Encoding; Fundamentals of Data Link Layer: Encapsulation, Framing, CDMA/CD; Network Layer Protocols: IPv4 and IPv6, Forwarding, Routing, Multicasting; Transport Layer Protocols: UDP, TCP, SCTP, Flow control, Congestion control, Reliable packet delivery techniques; Application Layer Protocols: HTTP, FTP, SMTP, P2P file sharing protocols.

BiM303 (Eng) Microcomputers 3+2 7.0

Introduction to Microcomputers: Microprocessor, Memory, I/O, Buses; Programming Structure and Software Development Flow: Low and high level programming languages, Software development tools; Architecture of Microprocessor: Basic instruction cycle, Registers; Addressing Modes: Data addressing, Program memory addressing, Stack memory addressing; Instructions: Instruction format, Data movement instructions, Arithmetic and logic instructions, Program control instructions; Memory Interface: Memory connections, Memory types, Error correction; I/O Interface: Isolated I/O, Memory mapped I/O, Handshaking, Serial and parallel communication; Interrupts: Polling and interrupt, Types of interrupts; Microprocessor Performance; Floating Point Arithmetic.

BiM304 (Eng) Computer Algorithm Design 3+0 6.0

Introduction; The Role of Algorithms in Computing; Algorithms as a Technology; Sorting; Analysis of Sorting Algorithms; Heap Sort and Quick Sort; Algorithm Performance Analysis; Space Complexity; Time Complexity; Asymptotic Notations: , and notations; Arrays and Matrices; C++ Classes: Array1D, Array2D, Matrix; Stack and Queue Manipulation Algorithms; Trees; Binary Trees; Abstract Data Type for Trees; Tree Traversal Algorithms; Graphs; Graph Search Methods; Algorithm

Design Techniques; The Greedy Method; 0/1 Knapsack Problem; Divide and Conquer Method; Merge Sort; Branch and Bound Method; Traveling Salesperson Problem.

BiM305 (Eng) Computer Organization 3+0 5.0

Performance: Measuring performance, Performance metrics, SPEC benchmarks, Comparing and summarizing performance; MIPS Instruction Set Architecture; Arithmetic for Computers: ALU design, Integer multiplication and division, Floating point operations; The Processor: Single cycle datapath design, Controller design for a single cycle datapath, Multicycle datapath design, Controller design for a multicycle datapath; Pipelining: A pipelined datapath and its control, Data hazards and forwarding, Data hazards and stalls, Branch hazards; Caches: Basics of caches, Measuring and improving cache performance.

BiM306 (Eng) Operating Systems 3+0 4.5

Operating Systems; History of Operating Systems; Process Concept: States and Process Control Blocks; OS Kernel; Concurrent Processes; Mutual Exclusion; Process Synchronization; Semaphores; Memory Management and Scheduling; Fixed and Multiple Partitioned Multiprogramming; Virtual Memory; Paging and Segmentation; On Demand Paging and Segmentation; Operations on Moving Head Disks; Disk Scheduling Policies; File and Database Systems; File System Functions; Blocking and Buffering; File Organization; Back-up and Optimization; Database Systems and Models, Case Studies: UNIX, NT, LINUX. Operating Systems; History of Operating Systems; Process Concept: States and Process Control Blocks; OS Kernel; Concurrent Processes; Mutual Exclusion; Process Synchronization; Semaphores; Memory Management and Scheduling; Fixed and Multiple Partitioned Multiprogramming; Virtual Memory; Paging and Segmentation; On Demand Paging and Segmentation; Operations on Moving Head Disks; Disk Scheduling Policies; File and Database Systems; File System Functions; Blocking and Buffering; File Organization; Back-up and Optimization; Database Systems and Models, Case Studies: UNIX, NT, LINUX.

BiM308 (Eng) Web Server Programming 3+0 6.0

Web-Based and Client-Based Programming; Publishing Web Pages; Comparison of HTML Pages and ASP Pages; IIS and Management of Web Sites; Web-Based Programming Languages and Tools; .NET Framework; Common Language Runtime (CLR); ASP.NET v2.0: Building a web application, Performing data access, Form input controls, Master pages, Storing user profiles, Caching for performance, Internationalizing, User controls, Session and application variables; Web Services: XML, SOAP protocol, Web services returning various data types. Web-Based and Client-Based Programming; Publishing Web Pages; Comparison of HTML Pages and ASP Pages; IIS and Management of Web Sites; Web-Based Programming Languages and Tools; .NET Framework; Common Language Runtime (CLR); ASP.NET v2.0: Building a web application, Performing data access, Form input controls, Master pages, Storing user profiles, Caching for performance, Internationalizing, User controls, Session and application variables; Web Services: XML, SOAP protocol, Web services returning various data types.

BiM309 (Eng) Artificial Intelligence 3+0 4.5

Introduction to Artificial Intelligence; Intelligent Agents; Solving Problems by Searching; Search Strategies; Constraint Satisfaction Problems; State Space Search; Data-Driven and Goal-Driven Search; Heuristic Search; Informed Search Methods; Agent Based on Logical Reasoning in Building a Knowledge Base; Inference in First-Order Logic; Uncertainty; Probabilistic Reasoning Systems; Machine Learning; Inductive Learning; Decision Trees; Knowledge in Learning. Introduction to Artificial Intelligence; Intelligent Agents; Solving Problems by Searching; Search Strategies; Constraint Satisfaction Problems; State Space Search; Data-Driven and Goal-Driven Search; Heuristic Search; Informed Search Methods; Agent Based on Logical Reasoning in Building a Knowledge Base; Inference in First-Order Logic; Uncertainty; Probabilistic Reasoning Systems; Machine Learning; Inductive Learning; Decision Trees; Knowledge in Learning.

BiM311 (Eng) Systems Analysis and Design 3+0 4.5

Introduction to the Concept of System and General Specifications of Systems: Analysis, Design, Implementation of information systems; Feasibility Work; Management Concepts; Data and Information; Determination of Information Requirements; Methods and Tools of Systems Analysis; Structured Tools; Integration of Phases in Information Systems Development; Information Systems Development Methodologies; User Interface; Importance of Maintenance; Some Case Studies on Information Systems Applications. Introduction to the Concept of System and General Specifications of Systems: Analysis, Design, Implementation of information systems; Feasibility Work; Management Concepts; Data and Information; Determination of Information Requirements; Methods and Tools of Systems Analysis; Structured Tools; Integration of Phases in Information Systems Development; Information Systems Development Methodologies; User Interface; Importance of Maintenance; Some Case Studies on Information Systems Applications.

BiM312 (Eng) Database Management Systems 3+0 6.0

Database; Database Management Systems; Basic Concepts and Definitions; Database Architecture: External level, Conceptual level and Internal level; Schemas; Data Independence; Data Models: Entity-Relationship model, Hierarchical model, Network model, Relational model; Dependencies between Attributes; Normal Forms; Design Criteria; Hierarchical Database Systems; Network Database Systems; Relational Database Systems; Data Definition; Data Manipulation; Query

Languages; Relational Algebra Operators; Relational Calculus; Examples of Relational Query Languages: SQL, QUEL, QBE; Operational Requirements: Security, Integrity, Accuracy, Concurrency, Performance.

BiM314 (Eng) Theory of Computation 3+0 4.5

Formal Languages; Grammars and the Chomsky Hierarchy; Regular Expressions; Finite State Machines; Mealy and Moore Models; Machine Congruence and State Reduction; Deterministic and Non-deterministic Automata; Push-down Automata and Context-free Grammars; Turing Machines and Computability; Introduction to Coding; Group Codes. Formal Languages; Grammars and the Chomsky Hierarchy; Regular Expressions; Finite State Machines; Mealy and Moore Models; Machine Congruence and State Reduction; Deterministic and Non-deterministic Automata; Push-down Automata and Context-free Grammars; Turing Machines and Computability; Introduction to Coding; Group Codes.

BiM405 (Eng) Project Management 3+0 4.5

Fundamental Concepts; Planning and Supervision Needs; Steps of a Project; Feasibility Studies; Cost-effect Analysis; Writing a Project Report; Budget Planning; Forming a Project Team; Project Management Techniques; Charts: PERT, CPM, Gantt; Writing a Project Proposal and Report. Fundamental Concepts; Planning and Supervision Needs; Steps of a Project; Feasibility Studies; Cost-effect Analysis; Writing a Project Report; Budget Planning; Forming a Project Team; Project Management Techniques; Charts: PERT, CPM, Gantt; Writing a Project Proposal and Report.

BiM411 (Eng) Decision Support Systems 3+0 3.0

Rational Decision Making and Appropriate Data Support; Components of Decision Support Systems (DSS): Data, Information, Databases, Database management systems, Knowledgebase, Data Warehouses, Rulebase/Modelbase; Expert Systems Mechanism and Certainty Factors; System Dynamics and Simulation; Group DSS; Executive Information Systems; User-Interface Components; Designing of DSS; Implementation of DSS; Evaluation of DSS. Rational Decision Making and Appropriate Data Support; Components of Decision Support Systems (DSS): Data, Information, Databases, Database management systems, Knowledgebase, Data Warehouses, Rulebase/Modelbase; Expert Systems Mechanism and Certainty Factors; System Dynamics and Simulation; Group DSS; Executive Information Systems; User-Interface Components; Designing of DSS; Implementation of DSS; Evaluation of DSS.

BiM423 (Eng) Software Engineering 3+2 6.0

System Theory; Characteristics and Problems of Large Software Projects; Software Development Life Cycle; Software Development Models; Software Standards; Planning and Management of a Software Project; Software Requirements; Software Design; Software Implementation and Coding; Software Testing; Software Installation; Software Maintenance; Software Documentation; Software Quality Assurance and Management; Overview of CASE Technologies.

BiM437 (Eng) Computer Engineering Design 1+2 4.0

Applications of Programming languages, Management information systems, software engineering, parallel and distributed systems, project management, algorithm analysis and design, neural networks, signals and systems, and Microprocessors concepts to everyday life problems using a design and implementation based project .Seminars on contemporary software and their applications. Applications of Programming languages, Management information systems, software engineering, parallel and distributed systems, project management, algorithm analysis and design, neural networks, signals and systems, and Microprocessors concepts to everyday life problems using a design and implementation based project .Seminars on contemporary software and their applications.

BiM439 (Eng) Applications of Database Management Systems 3+0 4.5

Triggers and Active Databases; Physical Data Organization and Indexing; Transactions; Concurrency Control; Recovery Protocols; Query Processing and Optimization; Database Tuning; Object Databases; Network Storage Systems; Web-based Database Applications; Security and Authorization Models; Data Mining and Data Warehouse. Triggers and Active Databases; Physical Data Organization and Indexing; Transactions; Concurrency Control; Recovery Protocols; Query Processing and Optimization; Database Tuning; Object Databases; Network Storage Systems; Web-based Database Applications; Security and Authorization Models; Data Mining and Data Warehouse.

BiM441 (Eng) Introduction to Rough Sets Theory 3+0 4.5

The Concept of Rough Sets; Knowledge Systems; Data Gathering and Digitization; Discernibility Set Approach; Core & Reduction and Reduction Algebra; Decision Rules and Synthesis; Discernibility Matrix and Functions; Decision-based Discernibility Matrix; Decision-based Discernibility Functions; Reduction Algorithms; Solution of Real State Problems by Using Rough Sets. The Concept of Rough Sets; Knowledge Systems; Data Gathering and Digitization; Discernibility Set Approach; Core & Reduction and Reduction Algebra; Decision Rules and Synthesis; Discernibility Matrix and Functions; Decision-based Discernibility Matrix; Decision-based Discernibility Functions; Reduction Algorithms; Solution of Real State Problems by Using Rough Sets.

BiM443 (Eng) Blockchain and Cryptocurrency Technologies 3+0 4.5

Cryptography and Cryptocurrencies: History of cryptocurrencies; Bitcoin's Consensus Mechanism: Centralization vs. decentralization, Distributed consensus; The blockchain; Bitcoin Applications and Security: Storing Bitcoins, Transaction fees; Bitcoin Mining: Strategies; Alternative Mining Puzzles: Proof of useful work; Bitcoin and Anonymity: Anonymity basics, Decentralized mixing; Altcoins: Interaction between Bitcoin and Altcoins; Ethereum; Programming Smart Contracts on Ethereum: Solidity language; Scalability: Off-chain channels; The Real World: Smart property, Public randomness; The Future of Bitcoin.

BiM444 (Eng) Computer Engineering Applications 2+4 7.0

Selections from Current Computer Engineering Topics Such As: Programming languages, Management information systems, Software engineering, Parallel and Distributed systems, Project management, Analysis of algorithms, Neural networks, Signals and systems, Microprocessors. Selections from Current Computer Engineering Topics Such As: Programming languages, Management information systems, Software engineering, Parallel and Distributed systems, Project management, Analysis of algorithms, Neural networks, Signals and systems, Microprocessors.

BiM445 (Eng) Enterprise IT Architecture 2+0 3.0

What is enterprise software architecture? What are the types of architecture? What are the technological solutions for architecture? What are the next generation technology heaps used in architectural solutions? Programming languages (web development technology stack JavaScript, CSS, HTML, etc, server layer node.js, java, etc., databases - document base and relational), ready-made application patterns and development frameworks. What is reusability and how is it provided? Design according to reusability principles, ready libraries, DevOps tools, SCM tools. Project management approaches to increase production efficiency and PaaS application development options.

BiM446 (Eng) Analysis of Algorithms 3+0 4.5

Algorithm Analysis Techniques: Big-O, Omega, Theta asymptotic notations; Sorting and Searching Algorithms; Selection; Binary and Binomial Heaps; Greedy Algorithms; Dynamic Programming: 0-1 knapsack problem, Chain matrix multiplication, Longest common subsequence; Graphs and Graph Algorithms: BFS, DFS, Topological sort, Shortest path algorithms, Minimum spanning tree algorithms; NP-Completeness: Definition, Cook's theorem, Reductions; Approximation Algorithms. Algorithm Analysis Techniques: Big-O, Omega, Theta asymptotic notations; Sorting and Searching Algorithms; Selection; Binary and Binomial Heaps; Greedy Algorithms; Dynamic Programming: 0-1 knapsack problem, Chain matrix multiplication, Longest common subsequence; Graphs and Graph Algorithms: BFS, DFS, Topological sort, Shortest path algorithms, Minimum spanning tree algorithms; NP-Completeness: Definition, Cook's theorem, Reductions; Approximation Algorithms.

BiM448 (Eng) Computer Graphics 3+0 4.5

Hardware and Software Components of Graphic Systems; Output and Filled-data Primitives; 2d and 3d Geometric Transformations; Two Dimensional Viewing: Viewing pipeline, Clipping, Windowing; Three Dimensional Viewing: Viewing pipeline, Viewing parameters, Projections, Viewing transformations, Clipping; Visible Surface Detection; Introduction to Illumination Models and Surface Rendering. Hardware and Software Components of Graphic Systems; Output and Filled-data Primitives; 2d and 3d Geometric Transformations; Two Dimensional Viewing: Viewing pipeline, Clipping, Windowing; Three Dimensional Viewing: Viewing pipeline, Viewing parameters, Projections, Viewing transformations, Clipping; Visible Surface Detection; Introduction to Illumination Models and Surface Rendering.

BiM450 (Eng) Network Management 3+0 4.5

Historical Process of Network Management; Network Management Infrastructure and Architecture; ISO Network Management Architecture and Models: Performance management, Configuration management, End-user account management, Error management, Security management, SNMP; VLANs and their management; Router, Firewall, NAT and ALG setup and management. Historical Process of Network Management; Network Management Infrastructure and Architecture; ISO Network Management Architecture and Models: Performance management, Configuration management, End-user account management, Error management, Security management, SNMP; VLANs and their management; Router, Firewall, NAT and ALG setup and management.

BiM451 (Eng) Web Server Programming with MVC 3+0 4.5

The Model-View-Controller (MVC) Design Pattern; Creating an MVC Web Application; Adding a Controller: Understanding actions, Mapping routes; Adding a View: The ViewBag object, Layout pages, Razor syntax, Linking to an action; Adding a Model: Working with an OR/M software, Create, Read, Update and Delete (CRUD) operations, GET and POST methods, Partial views, Creating custom display controls, Searching and filtering; Adding Validation; Security; Authentication and Authorization; Internationalization and Globalization.

BiM452 (Eng) Multimedia Computing 3+0 4.5

Multimedia Structures and Literature; Characteristics of Information Flow; Multimedia Entities: Voice, Video, Graphics, Text; Image and Graphics: Image processing; Video and Animation: Television, Computerized animation; Information encoding; Compression: Coding standards, Entropy; Video Encoding: JPEG, MPEG, DVI; Optic Storage: Video disks, Compaq disks, VCD, DVD; Multimedia Operating Systems: Multimedia storage, Retrieval, Transmission, Synchronization

techniques, Future of multimedia. Multimedia Structures and Literature; Characteristics of Information Flow; Multimedia Entities: Voice, Video, Graphics, Text; Image and Graphics: Image processing; Video and Animation: Television, Computerized animation; Information encoding; Compression: Coding standards, Entropy; Video Encoding: JPEG, MPEG, DVI; Optic Storage: Video disks, Compaq disks, VCD, DVD; Multimedia Operating Systems: Multimedia storage, Retrieval, Transmission, Synchronization techniques, Future of multimedia.

BiM453 (Eng) Introduction to Machine Learning 3+0 4.5

Introduction to Learning Algorithms; Linear Regression with One Variable; Linear Regression with Multiple Variables; Supervised Learning Algorithms and Classification; Regression and Classification with Neural Networks Models; Decision Tree Learning; Naive Bayes Classifier and Bayesian Networks; Genetic Algorithms; Support Vector Machines for Classification Problems; Hidden Markov Models; Unsupervised Learning Algorithms.

BiM454 (Eng) Programming Language Concepts 3+0 4.5

Introduction; Evolution of Programming Languages; Syntax and Semantics of Programming Languages; Formal Methods for Description of Programming Languages; Lexical and Syntactic Analysis; The Parsing Problem; Names; Bindings; Type Checking and Its Scope; Data Types; Expressions and Assignment Statements; Control Structures; Subprogram Mechanism; Abstract Data Types; Design Issues and Examples; Object Oriented Programming; Concurrency Levels; Exception Handling; Functional and Logical Programming Languages. Introduction; Evolution of Programming Languages; Syntax and Semantics of Programming Languages; Formal Methods for Description of Programming Languages; Lexical and Syntactic Analysis; The Parsing Problem; Names; Bindings; Type Checking and Its Scope; Data Types; Expressions and Assignment Statements; Control Structures; Subprogram Mechanism; Abstract Data Types; Design Issues and Examples; Object Oriented Programming; Concurrency Levels; Exception Handling; Functional and Logical Programming Languages.

BiM455 (Eng) Introduction to Hardware Design 3+0 4.5

Combinatorial Review; Sequential Review; Verilog: Language, Syntax, Tools, Simulation, Integrated Circuits & PLDs; Packaging Circuit Boards; Interconnection and Signal Integrity; Processor Basics: Embedded computer organization, ALU, Instructions & Data; Memory Organization: Memory interface; Cache memory; I/O Interfacing; I/O Devices; I/O Controllers; Parallel Busses; Serial transmission; I/O Software; Accelerators: General concepts; Case Study: Video edge detection, Verifying an accelerator; Design Methodology.

BiM456 (Eng) Network Security Principles 3+0 4.5

Introduction to Network Security; Main Problems in Network Security; Terminology; Active and Passive Attacks; Encryption Methods; Overview of Authentication Systems; 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; Strong Password Protocols; Digital Cash; DoS Attacks, Distributed DoS Attacks. Introduction to Network Security; Main Problems in Network Security; Terminology; Active and Passive Attacks; Encryption Methods; Overview of Authentication Systems; 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; Strong Password Protocols; Digital Cash; DoS Attacks, Distributed DoS Attacks.

BiM457 (Eng) Embedded Programming Languages 3+0 4.5

Introduction to Embedded Programming Languages; Compiling and Debugging Linux Applications; Introduction to Linux; Linux Kernel; Essential Commands and Tools in Linux; Handling Errors and Exceptions; Bash & Perl Programming; Python Programming; Embedded C Programming; Device Driver Concept; Timing in Linux; Interrupt Handling; Using DMA; Linux File System Concept; Linux and Real Time.

BiM458 (Eng) Simulation and Modeling 3+0 4.5

System Theory; Decision Making and Modeling; Simulation Methodologies and Science; Simulation Models; Continuous and Discrete Time Simulation; Selection of Input Probability Distributions; Random Number Generation; Data Analysis of a System Output; Statistical Comparison of Similar Systems; Modeling on Virtual Environment; Virtual Modeling Software; Development of Models by Using Lab View; Sample Model Development with Lab View. System Theory; Decision Making and Modeling; Simulation Methodologies and Science; Simulation Models; Continuous and Discrete Time Simulation; Selection of Input Probability Distributions; Random Number Generation; Data Analysis of a System Output; Statistical Comparison of Similar Systems; Modeling on Virtual Environment; Virtual Modeling Software; Development of Models by Using Lab View; Sample Model Development with Lab View.

BiM460 (Eng) Software Modeling 3+0 4.5

Software Development Methods; Advantages of Object Oriented Programming; Integrated Software Development Processes; Using Models in Software Development; Unified Modeling Language (UML); Requirements Analysis and Use Cases; Activity and Sequence Diagrams; Class Diagrams; Deployment Diagrams; Object Oriented Analysis and Modeling; Object Oriented Design and Modeling; Design Patterns. Software Modeling Applications by Using Software Development Tools. Software Development Methods; Advantages of Object Oriented Programming; Integrated Software Development Processes; Using Models in Software Development; Unified Modeling Language (UML); Requirements Analysis and Use

Cases; Activity and Sequence Diagrams; Class Diagrams; Deployment Diagrams; Object Oriented Analysis and Modeling; Object Oriented Design and Modeling; Design Patterns. Software Modeling Applications by Using Software Development Tools.

BiM462 (Eng) Parallel Systems 3+0 4.5

Parallel Applications: Weather forecasting; Speedup and Amdahl's Law; Parallel Algorithm Design Techniques: Domain decomposition, Recursive decomposition; Message Passing Computation and Message Passing Interface; Pipelined Computations: Sorting; Synchronous Computation and Barriers; Shared Memory Computation; Distributed Shared Memory; SIMD and Vector Processors; Overview of Parallel Architectures; Interconnection Networks: Bus, Mesh, Hypercube; Cache Consistency Protocols. Parallel Applications: Weather forecasting; Speedup and Amdahl's Law; Parallel Algorithm Design Techniques: Domain decomposition, Recursive decomposition; Message Passing Computation and Message Passing Interface; Pipelined Computations: Sorting; Synchronous Computation and Barriers; Shared Memory Computation; Distributed Shared Memory; SIMD and Vector Processors; Overview of Parallel Architectures; Interconnection Networks: Bus, Mesh, Hypercube; Cache Consistency Protocols.

BiM464 (Eng) Human-Computer Interaction 3+0 4.5

Human Factors in Software Development; Use of Database Systems; Design of Interactive Systems.; Science Bases: Theories, Models, Usability studies, Controlled experimentation; Software Engineering with User Interface Development Environments; Programming and command languages, Menus, Forms, Direct manipulation; Graphical User Interfaces; Computer-Supported Cooperative Work; Information Search and Visualization; Input/Output Devices; Display Design. Human Factors in Software Development; Use of Database Systems; Design of Interactive Systems.; Science Bases: Theories, Models, Usability studies, Controlled experimentation; Software Engineering with User Interface Development Environments; Programming and command languages, Menus, Forms, Direct manipulation; Graphical User Interfaces; Computer-Supported Cooperative Work; Information Search and Visualization; Input/Output Devices; Display Design.

BiM466 (Eng) Fuzzy Logic 3+0 4.5

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 Systems as Nonlinear Mappings; Design of Fuzzy Systems from Input-Output Data; Table Look-Up Scheme; Gradient Descent Training; Fuzzy Clustering, Neuro-Fuzzy (ANFIS). 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 Systems as Nonlinear Mappings; Design of Fuzzy Systems from Input-Output Data; Table Look-Up Scheme; Gradient Descent Training; Fuzzy Clustering, Neuro-Fuzzy (ANFIS).

BiM468 (Eng) Computer Aided Design 3+0 4.5

Use of Computers in Designing; Current Computer-Aided Design Software: Features, Applications; The Use of Computer Aided Design Software with Other Software; CAD; Production of Sample Designs Using CAD; Hardware Requirements for CAD; Menu / Command Structure; Initial Drawing Set-Ups and Prototype Drawings. Use of Computers in Designing; Current Computer-Aided Design Software: Features, Applications; The Use of Computer Aided Design Software with Other Software; CAD; Production of Sample Designs Using CAD; Hardware Requirements for CAD; Menu / Command Structure; Initial Drawing Set-Ups and Prototype Drawings.

BiM470 (Eng) Neural Networks 3+0 4.5

Fundamentals of Neural Networks: Neuron model, Neural network structures; Bayes Rules; Fuzzy Sets; Discriminate Analysis; Learning Rules and Tasks; Perception Methods; Single Layer Feedforward Networks; Multilayer Feedforward Networks; Least Mean Square Algorithm; Error Back-Propagation; Radial Basis Function Networks; Associative Memory: Analysis, Design; Functional Link Networks; Pattern Recognition; Relations on Neural Network Methods; Support Vector Machines; Self Organizing Maps. Fundamentals of Neural Networks: Neuron model, Neural network structures; Bayes Rules; Fuzzy Sets; Discriminate Analysis; Learning Rules and Tasks; Perception Methods; Single Layer Feedforward Networks; Multilayer Feedforward Networks; Least Mean Square Algorithm; Error Back-Propagation; Radial Basis Function Networks; Associative Memory: Analysis, Design; Functional Link Networks; Pattern Recognition; Relations on Neural Network Methods; Support Vector Machines; Self Organizing Maps.

BiM472 (Eng) Image Processing 3+0 4.5

Fundamentals of Digital Image Processing: Visual perception, Image sensing, Image sampling and quantization, Basic relationships between pixels; Image Enhancement in Spatial Domain: Gray level transformations, Histogram processing, Spatial filtering for smoothing and sharpening; Image Enhancement in Frequency Domain: Fourier transform, Frequency-domain filters for smoothing and sharpening, Homomorphic filtering; Image Restoration; Color Image Processing; Wavelets and Multiresolution Processing; Image Compression; Morphological Image Processing. Fundamentals of Digital Image Processing: Visual perception, Image sensing, Image sampling and quantization, Basic relationships between pixels; Image Enhancement in Spatial Domain: Gray level transformations, Histogram processing, Spatial filtering for smoothing and sharpening; Image Enhancement in Frequency Domain: Fourier transform, Frequency-domain filters for smoothing and sharpening, Homomorphic filtering; Image Restoration; Color Image Processing; Wavelets and Multiresolution Processing; Image Compression; Morphological Image Processing.

BiM474 (Eng) Introduction to Cryptography 3+0 4.5

Introduction to Cryptography and Encryption Algorithms; Private Key Encryption Algorithms: Data encryption standard, Triple data encryption standard, Advanced encryption standard; Public Key Cryptography; Public Key Encryption Algorithms: RSA, Diffie-Hellman, ElGamal, Public-Private key generation techniques; Conventional Encryption Techniques: Caesar cipher; The Uses of Encryption: Cryptographic hash functions, Key exchange, Certificates. Introduction to Cryptography and Encryption Algorithms; Private Key Encryption Algorithms: Data encryption standard, Triple data encryption standard, Advanced encryption standard; Public Key Cryptography; Public Key Encryption Algorithms: RSA, Diffie-Hellman, ElGamal, Public-Private key generation techniques; Conventional Encryption Techniques: Caesar cipher; The Uses of Encryption: Cryptographic hash functions, Key exchange, Certificates.

BiM476 (Eng) Data Acquisition and Processing 3+0 4.5

Use of Computers in Data Acquisition; Sensors and Interfaces; Sampling; Noise; Filtering; Computer Measurements; Parallel Input/Output; Interrupt Systems; Timers; Parallel and Serial Data Paths and Transmission; Using Direct Memory Access (DMA) for External Data Communication; Data Transfer; Basic Control Techniques; Real-Time Input Handling Techniques; Knowledge Discovery Process. Use of Computers in Data Acquisition; Sensors and Interfaces; Sampling; Noise; Filtering; Computer Measurements; Parallel Input/Output; Interrupt Systems; Timers; Parallel and Serial Data Paths and Transmission; Using Direct Memory Access (DMA) for External Data Communication; Data Transfer; Basic Control Techniques; Real-Time Input Handling Techniques; Knowledge Discovery Process.

BiM478 (Eng) Management Information Systems 3+0 4.5

An Overview of Management Information Systems (MIS); MIS as a Tool for Organization Development; Conceptual Fundamentals: Information; System; Planning; Control; Concepts of Organization and Management; Human as Information Processors; Decision-Making Processes; Methods of Selecting an Alternative; Structure of a Management Information System; MIS Support at Operational, Planning, Control, Decision Making, and Management Levels; Determination of Information Requirements; Development; Implementation; and Management of Information System Resources. An Overview of Management Information Systems (MIS); MIS as a Tool for Organization Development; Conceptual Fundamentals: Information; System; Planning; Control; Concepts of Organization and Management; Human as Information Processors; Decision-Making Processes; Methods of Selecting an Alternative; Structure of a Management Information System; MIS Support at Operational, Planning, Control, Decision Making, and Management Levels; Determination of Information Requirements; Development; Implementation; and Management of Information System Resources.

BiM480 (Eng) Compiler Design 3+0 4.5

Development of the Logical Design of a Compiler: Lexical analyzer, Parser, Semantic analyzer, Code generator, Code optimizer, Error recovery routines; Analysis of Formal Algorithms for Each Component; Description of Overall Compiler Construction Techniques; Code Analysis and Optimization Techniques. Development of the Logical Design of a Compiler: Lexical analyzer, Parser, Semantic analyzer, Code generator, Code optimizer, Error recovery routines; Analysis of Formal Algorithms for Each Component; Description of Overall Compiler Construction Techniques; Code Analysis and Optimization Techniques.

BiM482 (Eng) Network Programming 3+0 4.5

TCP/IP Stack Overview and Socket Layer; UDP socket programming; POSIX I/O Models: Blocking, Non-blocking, signal driven and asynchronous I/O; Select/Poll System Calls; Multi-Threaded Server Design Techniques; TCP Socket Programming Techniques: Line-driven Protocol Design and Implementation Techniques; Socket Options; Broadcasting and Multicasting Applications. TCP/IP Stack Overview and Socket Layer; UDP socket programming; POSIX I/O Models: Blocking, Non-blocking, signal driven and asynchronous I/O; Select/Poll System Calls; Multi-Threaded Server Design Techniques; TCP Socket Programming Techniques: Line-driven Protocol Design and Implementation Techniques; Socket Options; Broadcasting and Multicasting Applications.

BiM484 (Eng) Distributed Systems 3+0 4.5

Distributed System Architectures; Goals: Transparency, Scalability, Fault tolerance, Replication; Remote Procedure Calls and Remote Object Invocation; Naming: X.500; Synchronization: Clock synchronization; Mutual Exclusion; Consistency and Replication Techniques; Fault Tolerance; Distributed Object Systems: DCOM, CORBA; Distributed File Systems: NFS, AFS, XFS, CODA, Network attached storage devices (NASD). Distributed System Architectures; Goals: Transparency, Scalability, Fault tolerance, Replication; Remote Procedure Calls and Remote Object Invocation; Naming: X.500; Synchronization: Clock synchronization; Mutual Exclusion; Consistency and Replication Techniques; Fault Tolerance; Distributed Object Systems: DCOM, CORBA; Distributed File Systems: NFS, AFS, XFS, CODA, Network attached storage devices (NASD).

BiM485 (Eng) Research in Computer Science I 3+0 4.5

Preparing students for research in Computer Science; Participating in academic research under advisement; Research in Computer Networks: Peer-to-Peer Networks, Overlay Networks, Quality of Service Protocols, Sensor Networks, Voice over IP Protocols; Research in Information Retrieval: Information Extraction, Text Classification, Clustering; Learning in High

Dimensional Spaces; Research in Data Mining: Data pre-processing, Association Rule Mining, Classification, Clustering, Prediction, Collaborative Filtering; Research in Artificial Intelligence and Fuzzy Systems; Expert Systems; Approximate Reasoning; Fuzzy Logic; Fuzzy Reasoning; Fuzzy Inference Systems; Function Approximation; Time Series Prediction. Preparing students for research in Computer Science; Participating in academic research under advisement; Research in Computer Networks: Peer-to-Peer Networks, Overlay Networks, Quality of Service Protocols, Sensor Networks, Voice over IP Protocols; Research in Information Retrieval: Information Extraction, Text Classification, Clustering; Learning in High Dimensional Spaces; Research in Data Mining: Data pre-processing, Association Rule Mining, Classification, Clustering, Prediction, Collaborative Filtering; Research in Artificial Intelligence and Fuzzy Systems; Expert Systems; Approximate Reasoning; Fuzzy Logic; Fuzzy Reasoning; Fuzzy Inference Systems; Function Approximation; Time Series Prediction.

BiM486 (Eng) Research in Computer Science II 3+0 4.5

Preparing students for research in Computer Science; Participating in academic research under advisement; Research in Parallel and Distributed Systems: Storage Architectures and File Systems; Grid Computing; Agent-based Computing; Research in Natural Language Processing: Turkish Text Analysis, Morphological Analysis; Search and Ranking Algorithms; Learning Approaches to Ranking; Research In Data Mining with Privacy: Privacy, Distributed Data-based Data Mining Tasks with Privacy, Privacy-preserving Data Mining, Privacy-preserving Collaborative Filtering; Research in Neural Networks: Multi-layer Perception, Recurrent Neural Networks, Fuzzy Neural Networks, Wavelet Neural Networks; Function Learning. Preparing students for research in Computer Science; Participating in academic research under advisement; Research in Parallel and Distributed Systems: Storage Architectures and File Systems; Grid Computing; Agent-based Computing; Research in Natural Language Processing: Turkish Text Analysis, Morphological Analysis; Search and Ranking Algorithms; Learning Approaches to Ranking; Research In Data Mining with Privacy: Privacy, Distributed Data-based Data Mining Tasks with Privacy, Privacy-preserving Data Mining, Privacy-preserving Collaborative Filtering; Research in Neural Networks: Multi-layer Perception, Recurrent Neural Networks, Fuzzy Neural Networks, Wavelet Neural Networks; Function Learning.

BiM488 (Eng) Introduction to Pattern Recognition 3+0 4.5

Components of Pattern Recognition System: Pattern, Feature Extraction, Classification; Probability and Linear Algebra; Bayes based Classifiers: Bayes Classifier, Naïve Bayes Classifier, Minimum Distance Classifiers; Linear Classifiers: Linear Discriminant Analysis, Perceptron Algorithm; Nonlinear Classifiers: Decision Trees; Analysis of Classification Performance; Text Recognition; Speech Recognition; Image Recognition. Components of Pattern Recognition System: Pattern, Feature Extraction, Classification; Probability and Linear Algebra; Bayes based Classifiers: Bayes Classifier, Naïve Bayes Classifier, Minimum Distance Classifiers; Linear Classifiers: Linear Discriminant Analysis, Perceptron Algorithm; Nonlinear Classifiers: Decision Trees; Analysis of Classification Performance; Text Recognition; Speech Recognition; Image Recognition.

BiM490 (Eng) Introduction to Information Retrieval 3+0 4.5

Boolean Retrieval; Term Vocabulary; Posting Lists; Index Construction; Index Compression; Scoring; Term Weighting; Vector Space Model; Evaluation in Information Retrieval; Relevance Feedback; Query Expansion; XML Retrieval; Language Models; Text Classification; Clustering; Web Search. Boolean Retrieval; Term Vocabulary; Posting Lists; Index Construction; Index Compression; Scoring; Term Weighting; Vector Space Model; Evaluation in Information Retrieval; Relevance Feedback; Query Expansion; XML Retrieval; Language Models; Text Classification; Clustering; Web Search.

BiM492 (Eng) Design Patterns 3+0 4.5

Essential Elements of Design Patterns: Pattern Name, Problem, Solution, Consequences; Object-Oriented Design Principles: Polymorphism, Abstraction, Classes, Encapsulation; Observer Pattern; Template Method Pattern; Factory Pattern; Singleton Pattern; Iterator Pattern; Composite Pattern; Facade Pattern; State and Strategy Patterns, Functors and Command Patterns; Proxy Pattern; Adapter Pattern; Decorator Pattern; Chain of Responsibility Pattern. Essential Elements of Design Patterns: Pattern Name, Problem, Solution, Consequences; Object-Oriented Design Principles: Polymorphism, Abstraction, Classes, Encapsulation; Observer Pattern; Template Method Pattern; Factory Pattern; Singleton Pattern; Iterator Pattern; Composite Pattern; Facade Pattern; State and Strategy Patterns, Functors and Command Patterns; Proxy Pattern; Adapter Pattern; Decorator Pattern; Chain of Responsibility Pattern.

BiM493 (Eng) Mobile Programming I 3+0 4.5

Mobile Computing: Mobile computing platforms, Smart devices, Mobile development environments, Android Overview; Android Environment SDK; Environment Emulator and Applications Life Cycle; User Interfaces; XML Layouts; Selection Widgets; Date-Time Tabs; Hard and Soft Keyboard; Fonts; Menus; The WebKit Browser; Intents; Inter-Process Communication Using Bundles; Multi-Threading.

BiM494 (Eng) Mobile Programming II 3+0 4.5

External Resources; Location Based Services; Working with MapViews; Services and Broadcast Receivers; Notifications and Intent Filters; Telephony and SMS; Sensors; Touch and Gestures; SQL Databases; Bluetooth Communication; Network Connectivity and WiFi.

BiM496 (Eng) Computer Vision 3+0 4.5

Image Formation and Image Sensing; Binary Images: Geometrical properties, Topological properties; Regions and Image Segmentation; Image Processing: Edge detection, Contour extraction, Color; Motion Field and Optical Flow; Stereo Correspondance; Three-dimensional Image Analysis: Shape from shading, Reconstruction from projections; Pattern Classification and Object Recognition; Tracking.

BiM498 (Eng) Embedded Software Design 3+0 4.5

Introduction to Embedded Systems: What is an embedded system? Real-time embedded systems, Embedded system design examples, Development environment, The C language; Compiling & Debugging: Compile process, Cross-compilers, Debug monitors, Remote debuggers, Emulators; Hardware Fundamentals & Peripherals: Control and status registers, Device driver philosophy, GPIO's, Serial Port, Ethernet, USB; Interrupts: Overview, Priorities, ISR; Embedded Linux: Operating system fundamentals, Kernel architecture, Boot sequence, System initialization, The Scheduler, System programming, Process management, Synchronization.

BiY353 Environmental Microbiology 3+0 4.5

Description of Microorganisms: Bacteria, Blue-green algae, Viruses, Fungi; Environmental Needs; Growth: Growth of microorganisms, Monod kinetics, Quantitative measures; Microbiological Control: Physical and chemical methods, Chemotherapeutics; Applied Microbiology: Natural water, Drinking water, Wastewater, Microbiological pollution, Treatment; Microorganisms in Air and Investigation Methods; Industrial Microbiology: Fermentation, Biosynthesis; Use of Microorganisms: Food, Biogas, Metal leaching, Production of petroleum.

BiY357 Environmental Microbiology Laboratory 0+3 2.5

Presentation of Material and Equipment that are Used in Microbiological Investigations; Sterilization and Disinfection; Various Media and Preparation Methods; Preparation Techniques for Microorganisms; Coloring and Examination Methodology of Microorganisms; Size Measurements of Microorganisms; Determination of Microorganism Numbers (Enumeration); Examples of Microorganisms in Water, Air and Soil; Presentation of Microorganisms that are Used in Biological Treatment.

ÇEV203 (Eng) Introduction to Environmental Engineering 2+0 3.5

Scope, Definition and Historical Development of Environmental Engineering; Overview of Environmental Engineering and Education; Fundamental Concepts; Introduction to Various Forms of Water, Air and Soil Pollution; Pollutants and Their Characteristics; Introduction to Water and Wastewater Treatment; Overview of Air Pollution and Control; Solid Wastes: Disposal and Reuse; Overview of Global Environmental Problems; Technical, Economic and Organizational Considerations of Environmental Quality.

ÇEV206 (Eng) Environmental Chemistry II 3+0 4.5

Carbonate Chemistry in Natural Water and Wastewater; Nitrogen Species in Water and Wastewater: Ammonification, Nitrification, Denitrification, Nitrogen Fixation; Phosphorus and Detergents; Chemical Oxygen Demand, Biochemical Oxygen Demand and Its Kinetics; Natural and Synthetic Organics in Water and Wastewater; Colloidal Chemistry and Colloids: Formation and species, Charge acquisition, Destabilization and aggregation; Introduction to Atmospheric Chemistry; Important Anthropogenic Air Pollutants.

ÇEV209 (Eng) Technical English I 3+0 2.5

Technical Vocabulary for Environmental Sciences and Environmental Engineering; Readings of Selected Passages from Environmental Engineering Literature; Translation of Passages Related to Topics in Environmental Sciences and Engineering from English to Turkish.

ÇEV210 (Eng) Technical English II 2+0 2.0

Translation of Passages Related to Topics in Environmental Sciences and Engineering from Turkish into English; Explanation of Words and Terms Used Frequently in Environmental Sciences and Engineering and Their Use in Sentences; Use of Visual Materials in Class With Active Participation of Students; Short Presentations in English Based on Visual Materials and Selected Passages From Literature; Technical Report Writing.

ÇEV211 Environmental Chemistry Laboratory I 0+3 3.0

General Rules of Environmental Chemistry I Laboratory; Laboratory Safety; Overview of Environmental Analyses; Fundamental Concepts and Information about the Equipment and Materials Used in Environmental Chemistry I Laboratory; Calculation of Measurement Uncertainty in Chemical Analyses; Installation of Experimental Systems and Preparation of Solutions; Standardization of Solutions Used in the Laboratory; Physical and Chemical Analyses in Natural Water and Wastewater: Gravimetric analysis, Conductivity analysis, Acidity and alkalinity analysis, Hardness analysis, Chloride analysis, Turbidimetric sulphate analysis, Chlorine analysis.

ÇEV212 (Eng) Environmental Chemistry Laboratory II 0+3 3.0

General Rules of Environmental Chemistry II Laboratory; Fundamental Concepts and Information about the Equipment and Materials Used in Environmental Chemistry II Laboratory; Installation of Experimental Systems and Preparation of Solutions; Heavy Metal Analysis in Solid Materials; Physical and Chemical Analyses in Natural Water and Wastewater: Boron, Oil and grease, Total Kjeldahl nitrogen, Phosphorus, Biochemical oxygen demand, Chemical oxygen demand; Principles of Sampling in Water and Soil and Multi-analysis Applications in Composite Samples. General Rules of Environmental Chemistry II Laboratory; Fundamental Concepts and Information about the Equipment and Materials Used in Environmental Chemistry II Laboratory; Installation of Experimental Systems and Preparation of Solutions; Heavy Metal Analysis in Solid Materials; Physical and Chemical Analyses in Natural Water and Wastewater: Boron, Oil and grease, Total Kjeldahl nitrogen, Phosphorus, Biochemical oxygen demand, Chemical oxygen demand; Principles of Sampling in Water and Soil and Multi-analysis Applications in Composite Samples.

ÇEV213 Environmental Chemistry I 3+0 4.5

Description of Environmental Chemistry: Formation, availability, and distribution of elements on earth,; Organic and Inorganic Compounds in Environmental Engineering and Their Nomenclature; Concentration Units and Stoichiometric Calculations; Analysis Techniques, Calculation of Ion Intensity; Oxygen Solubility: Henry's law, Equalization of reactions, Rates of reactions, Equilibrium; Preparation of Solutions, Acids and Bases; Acids with Single and Multiple Protons and Calculations of pH; Analysis Techniques in Environmental Engineering: Introduction to laboratory methods and essential principles, Solubility in chemical treatment, Buffer solutions, Hardness, Ion exchange and resins, Chemistry of sulphur, Chemistry of nitrogen, Acidity, Alkalinity, Chemistry of chlorine and disinfection.

ÇEV214 Environmental Ethics and Engineering Practices 2+0 2.0

Conceptual Introduction to Ethics: Ethical values and basic concepts; Ethics and Environment: Human-centered and nature-centered environmental ethics approach, Basic concepts and problems of environmental ethics, Examining environmental values and ethics together; Environmental Ethics and Engineering: Evaluation of environmental ethics from an engineering perspective, Importance of awareness of environmental ethics in a sustainable society, Case studies; International Norms Related to Environmental Ethics: Environmental Justice, Climate Change, Food Ethics, Nature and Naturalness, Sustainability, Population and Consumption, Future Generations, and Holism.

ÇEV216 Sustainability, Innovation and Project Management in Environmental Engineering 2+0 2.5

Concepts; Sustainability; Evolution from Environmental Protection into Sustainability; Sustainable Environmental Engineering; Design Principles in Sustainable Environmental Engineering; Measuring Sustainability; Green Engineering and Practices; Innovation: Entrepreneurship and Start-up Organization; Innovative Approaches in Sustainable Environmental Engineering; Life Cycle Cost and Benefit Analysis; Project Management; Scientific Research Process; Project Writing Process; Sustainability, Innovation and Risk Management in Projects; Sample Project Application.

ÇEV219 Ecology 3+0 4.5

Basic Rules and Concepts in Ecology; Autoecology: Abiotic factors and Effect of organisms, Terrestrial factors, Biological relations; Demecology: Descriptions and features of population structure, Quantitative changes; Dynamics of Populations: Species groups ecology; Community and Features; Ecosystem and Its Features; Matter Cycles in Ecosystems: Applied ecology; Environmental Ecology; Ecological Balance and Protection of Biological Diversity; Environmental Health.

ÇEV305 (Eng) Unit Operations and Processes I 4+0 6.0

Mass and Energy Balances; Flow Models and Reactors: Batch and continuous flow reactors, Completely-mixed reactors, Plug-flow reactors; Water and Wastewater Treatment Plants; Unit Operations and Processes in Water and Wastewater Treatment; Screening; Grit Removal; Flow Equalization; Neutralization; Coagulation and Flocculation; Sedimentation; Filtration; Flotation; Adsorption; Ion Exchange; Membrane Processes; Ammonia Removal.

ÇEV309 Social Environmental Science 2+0 3.0

Relationship Between Social Science and Environmental Science: Human, Society and Environment; Biopolitics; Origin of Environmental Problems; Modernization and Consumption Society; Current Environmental Problems Approach of Social Science Environment philosophy; Environmental ethics and Bioethics; Environmental Movements and Green Political Thought: Global environmental policies, Environmental policies in Turkey; Approach of Environmental Economy; Urban Environment and Environmental Aesthetic; Ecotourism.

ÇEV310 Water and Soil Pollution 3+0 4.5

General Definitions in Water and Soil Pollution; Characterization of Water Environment: Water environments (streams, lakes, oceans and groundwaters), Water quality; Water Pollution: Types and sources of pollutants, Organic pollution and eutrophication, Inorganic pollution, Pathogens, Metals and toxic materials; Characterization of Soil Environment; Soil Pollution: Pollutant sources, Fate of pollutants, Transport of pollutants; Agriculture and Erosion: Agricultural pollutants and

their effects, Effects of erosion on water and soil quality, Erosion control; Water and Soil Quality Criteria and Standards: Legal aspects of water and soil pollution control. General Definitions in Water and Soil Pollution; Characterization of Water Environment: Water environments (streams, lakes, oceans and groundwaters), Water quality; Water Pollution: Types and sources of pollutants, Organic pollution and eutrophication, Inorganic pollution, Pathogens, Metals and toxic materials; Characterization of Soil Environment; Soil Pollution: Pollutant sources, Fate of pollutants, Transport of pollutants; Agriculture and Erosion: Agricultural pollutants and their effects, Effects of erosion on water and soil quality, Erosion control; Water and Soil Quality Criteria and Standards: Legal aspects of water and soil pollution control.

ÇEV311 Environmental Economy 2+0 3.0

Environment and Economy: Conceptual Framework, Environmental assets and matter of property; Economic and Political Approach to Natural Resource and Environmental Problems in the Process of Historical Development: Macroeconomic approach in environment economy, Environment politics and management; Solution Alternatives of Environment Problems: On the basis of legal and market solution; Microeconomic Analyses on Pollution of Environment: Sustainable development indicators and indexes, contamination economics regarding to contamination economics and pollution controls; Classification of Resource in Economy; Principles of Utilization From Natural Resources and Economic Developments; European Union Environment Politics.

ÇEV312 Water Supply and Sewerage 3+0 4.5

Water Quantity: Factors affecting water use, Fluctuations; Population Forecasts and Design Flows; Quality of Water Resources; Relation of Water Quality to Environmental Health; Water Collection and Distribution; Pipes and Pipe Networks: Components, Design, Use, Maintenance; Pipe Networks and Water Quality; Wastewater Quantities: Factors affecting wastewater flows, Fluctuations in flows, Infiltration and inflow, Fluctuations; Stormwater: Quantity and Quality; Sewer Design Flows; Sewer Network: Appurtenances, Design, Construction, Maintenance; Use of Computer Programs in Pipe and Open Channel Network Design.

ÇEV313 (Eng) Unit Operations and Processes Laboratory I 0+3 3.0

General Rules of Laboratory; Laboratory Safety; Coagulation: Coagulants and their dosages, Coagulant aids, Jar tests; Flocculation; Sedimentation Test: Type I, II, III and IV settling, Batch settling tests, Data acquisition for primary clarifier design, calculation of settling efficiency; Filtration: Single-medium and multimedia filters, Sieve analysis, Particle density analysis, Determination of bed porosity, Calculation of filterability index, Determination of head loss in filtration columns; Adsorption: Theory of adsorption, Determination of Freundlich and Langmuir isotherms; Membrane Separation: Theory of membrane separation, Electro dialysis test; Ion Exchange. General Rules of Laboratory; Laboratory Safety; Coagulation: Coagulants and their dosages, Coagulant aids, Jar tests; Flocculation; Sedimentation Test: Type I, II, III and IV settling, Batch settling tests, Data acquisition for primary clarifier design, calculation of settling efficiency; Filtration: Single-medium and multimedia filters, Sieve analysis, Particle density analysis, Determination of bed porosity, Calculation of filterability index, Determination of head loss in filtration columns; Adsorption: Theory of adsorption, Determination of Freundlich and Langmuir isotherms; Membrane Separation: Theory of membrane separation, Electro dialysis test; Ion Exchange.

ÇEV314 (Eng) Unit Operations and Processes Laboratory II 0+3 3.5

General Rules of Unit Operations and Processes Laboratory II; Oxygen Transfer: Determination of the effects of different types of waste materials on the coefficient of absorption and oxygenation of a system; Anaerobic Digestion Test: Mass balance in a continuous anaerobic reactor, Effect of pH, Determination of chemical oxygen demand; Determination of alkalinity, Biogas measurement, Determination of mixed liquor volatile suspended solids; Aerobic Digestion Test: Examination of continuous aerobic reactor, Effect of pH, Determination of chemical oxygen demand, Determination of dissolved oxygen, Determination of mixed liquor volatile suspended solid; Design of Batch Anaerobic Reactor; Design of Batch Aerobic Reactor; Flotation Test: Removal of suspended solids and oil.

ÇEV315 Bioremediation Technologies 3+0 4.5

Concept of Bioremediation: Definition, Subjects, Characteristics; Bioremediation Techniques: In-situ, Ex-situ, Bioreactor, Natural reduction; Bioremediation Types: Bacterial remediation, Fungal remediation, Phytoremediation; Pollutants with Bioremediation: Heavy and light metals, Petroleum, Dyestuffs, Pesticides, Polycyclic aromatic hydrocarbons, Xenobiotic compounds, Chlorinated and nitro compounds; Bioremediation Strategies; Genetically modified microorganisms, Genetically modified plants, Nanoparticle use; Limitations in bioremediation.

ÇEV316 (Eng) Air Pollution 3+0 4.5

Basic Definitions and Concepts Related to Air Pollution and Control; Air Quality Management; Sources of Air Pollutants; Effects of Air Pollutants: Effects to living and non-living things; Indoor Air Pollution Models; Laws Related to Air Quality Control; Characterization and Monitoring of Air Pollution; Dispersion and Transportation of Pollutants: Horizontal and vertical dispersion of pollutants in the atmosphere and air pollution models. Basic Definitions and Concepts Related to Air Pollution and Control; Air Quality Management; Sources of Air Pollutants; Effects of Air Pollutants: Effects to living and non-living things; Indoor Air Pollution Models; Laws Related to Air Quality Control; Characterization and Monitoring of Air Pollution; Dispersion and Transportation of Pollutants: Horizontal and vertical dispersion of pollutants in the atmosphere and air pollution models.

ÇEV317 Agricultural Environmental Pollution 2+0 3.0

Environmental concept: Ecosystem and its characteristics; Causes of environmental problems, Pollution sources: Soil pollution, Agricultural environmental pollutants, Environmental effects of modern agricultural methods, Agricultural mechanization and environmental effects, Environmental effects of industrial livestock methods, Chemical fertilizers, Water pollution: Nitrogen and phosphorus pollution, Eutrophication; Pollution from pesticides: Environmental behavior of pesticides; Heavy metal accumulation; Incorrect irrigation; Other agricultural practices; Agro-environmental policies in Turkey.

ÇEV319 Scientific Reading and Writing Skills 2+0 3.0

Scientific Concepts: Academic titles, MSc, PhD; Scientific Products: Article, Proceedings, Poster, Thesis, CV; Scientific Research Process; Time Management in Research Process; Academic Databases and Usage; Academic Ethics and Plagiarism; Report Writing Process; Thesis Writing Process; Project Writing Process; Presentation Preparation Techniques; Scientific Programs; Sample Application for TUBITAK Undergraduate Student Project.

ÇEV320 Environmental Problems Resulting from Energy Production 3+0 4.0

Introduction: Energy systems, Transportation and delivery of energy, Efficiency and economics of energy; Electricity Production and Consumption in Turkey; Energy Policy in the European Union and Turkey: Environmental policy in energy production; Air Pollution Resulting from Energy Production: Thermal power plants and their environmental impacts, Environmental disasters in the past; Alternative Energy Sources and Their Environmental Impacts: Hydrogen, Wind, Biomass, Geothermal, Solar, Nuclear, Hydroelectric, Ocean, Wave, Ocean thermal and Tidal energy.

ÇEV324 (Eng) Unit Operations and Processes II 4+0 6.0

Biochemical Treatment Methods, Biochemical Kinetics; Biological Processes: Activated sludge processes and kinetic equations, Oxygen requirement, Nitrification, Activated sludge coefficients, Rate constants and coefficients in continuous-flow biological reactors; Oxygen Transfer and Mixing; Trickling Filters and Rotary Biological Contactors; Stabilization Ponds and Aerated Lagoons; Anaerobic Digestion, Aerobic Digestion; Natural Treatment Systems: Soil Based Systems, Aquatic Systems; Other Unit Operations and Processes: Water treatment, Wastewater treatment; Disinfection: Disinfectants, Disinfection kinetics

ÇEV326 Information Technologies in Environmental Engineering 3+0 4.0

Information Technologies: General information about informatics; Information technologies in Turkey; Environmental Data Management: Data capture, Data storage, Data analysis and decision support; Information Technologies in Air Quality Modeling and Measurement; Information Technologies in Solid Waste Management and Hazardous Waste Management; Information Technologies in Water Quality Monitoring and Measurement; Information Technologies in Application; Information technologies for environmental impact assessments; National environmental database system practices; Remote sensing practices; GIS practices; Other industrial practices.

ÇEV328 (Eng) Instrumental Analysis in Environmental Studies 3+0 4.5

Definition of Instrumental Analysis; Chromatographic methods: General definition of chromatography, Separation of the columns, Detectors, Principles of gas chromatography, Principles of liquid chromatography, Use of gas chromatography and liquid chromatography in environmental analysis; Spectroscopic Analysis Methods: Properties of electromagnetic radiation, Electromagnetic spectrum, Emission and absorption of radiation, Instrument components, Atomic absorption and emission, Ultraviolet (UV) and visible (VIS) spectroscopy, Use of spectroscopy in environmental analysis; Sample Handling and Preparation; Errors in Chemical Analysis; Statistical Evaluation of the Analytical Data; Report Writing.

ÇEV332 Introduction to Ecological Economy 3+0 4.5

What is Ecological Economy; The Global Ecosystem and the Economic Subsystem: Ecosystems and ecological services; Natural resources, Ecosystems, Biodiversity and ecological services, Material and energy flows in ecological and economic systems; Human-Ecosystems Interactions; Sustainability in Ecological Terms; Accounting for natural Capital, Ecological Limits and Sustainability: Sustainable development indicators in ecological economics; Welfare and well-being, Ecological footprint, carbon footprint, Water footprint, Biocapacity, Carrying capacity, Towards a Green Economy: Industrial ecology; Eco- Industrial parks, Green economy and opportunities, Ecological economic assessment and management; Policies, Institutions and Instruments.

ÇEV336 Environmental Health 3+0 4.5

Concept of Environmental Health: Definition, Subjects, Characteristics; The Relationship between Environment and Health: Personal environment, Biological environment, Social, cultural and economic environment; Environment epidemiology: Environmental exposure, Toxic exposure, Environmental burden of disease; Risk assessment: Biomarkers, Risk perception, Risk management and communication; Environment and Human: Drinking and usage water, Air, Soil, Agriculture, Solid wastes; Urban, Environment and Health: Hospital environmental health, School environmental health, Tourism, Sports, Visual pollution, Noise, Illumination; Environmental Legislation in European Union and Turkey.

ÇEV340 Applied of Environmental Statistics Analysis 2+0 3.0

Introduction to Environmental Statistics and Its Importance; Sample Collection: Sampling process; Frequency Analysis; The Distribution of Sampling: Normal distribution, Log-normal distribution; Inferential Statistics and Hypothesis Testing: Test of Z, Test of T, Test of F; Analysis of Variance; Graphical Data Analysis: The use of the scatterplot in environmental data analysis, Standard addition and internal standard methods; Multivariate Data Analysis: Regression and correlation; Introduction to Minitab Statistical Program; Design of Experiments: Factorial experimental designs, Taguchi experimental design.

ÇEV408 Water Quality Assessment 3+0 4.0

Sources and Characteristics of Water Pollutants; Characterization of Water Environments; Planning Water Quality Monitoring Programs; Site Selection and Determination of Monitoring Frequency; Selection of Monitoring Parameters; Sampling Methods: Discharge measurement, Sampling physical, chemical and biological parameters; Analysis Methods; Analysis; Reduction of Continuously Monitored Data; Trend Analysis of Water Quality Constituents; Analysis of Completed Monitoring Programs.

ÇEV409 Experimental Design 3+0 4.0

Utilisation of Statistics in Scientific Work and Engineering Applications; Regression and Correlation: Linear and non-linear correlations, Multiple correlations; Analysis of Variance; Comparison of the Means of Two Different Processes; Steps of Experimental Design and Its Application to Special Problems; 2k and 3k Full Factorial Design; Fractional Factorial Design; Time Series Analysis; Computer-aided Problem Solutions: Utilization of statistical software such as Minitab, SPSS, Statview, etc.

ÇEV413 (Eng) Flow Through Porous Media and Modeling 3+0 4.0

Porosity, Tortuosity, Conductance, and Capillarity Concepts; Statics and Transport of Fluids Through Porous Matrix; Darcy's Law and Compressibility Effects; Flow of Heterogeneous Fluids and Unsteady Conditions; Interactions Between Fluid and Solid; Continuity of Mass and Momentum; Thermal Flow; Stochastic Approaches to Transport Phenomena; Simulation Models and Analogies, Transport and Diffusion of Contaminants Through Porous Media. Porosity, Tortuosity, Conductance, and Capillarity Concepts; Statics and Transport of Fluids Through Porous Matrix; Darcy's Law and Compressibility Effects; Flow of Heterogeneous Fluids and Unsteady Conditions; Interactions Between Fluid and Solid; Continuity of Mass and Momentum; Thermal Flow; Stochastic Approaches to Transport Phenomena; Simulation Models and Analogies, Transport and Diffusion of Contaminants Through Porous Media.

ÇEV421 Solid Waste Management 3+2 6.0

Municipal Solid Waste Management: Composition of solid wastes, Physical, chemical and biological properties; National and International Legislation; Collection of Solid Wastes: Analysis of collection systems, Optimization of collection routes; Integrated Solid Waste Management Principles; Engineering Principles: Minimization, Reuse, Recycle, Composting, Thermal conversion technologies, Sanitary landfill.

ÇEV423 Applications of Remote Sensing and GIS in Environmental Sciences 3+0 4.5

Definition of Remote Sensing (RS); Brief History of RS; Energy Concept for RS; Principles Electromagnetic Radiation; Radiation-Matter Interaction; Spectral Signatures; Resolution for Remote Sensing; Image Processing; Image Classification; What is Geographic Information Systems (GIS)?; Application of GIS for RS Data; What is Feature and Feature classes?; Types of Digital Graphic Data; What is Topology?; GIS Analyses.

ÇEV427 (Eng) Air Pollution Control 3+0 4.5

Air Pollution Control Strategies: Dilution in atmosphere, Process modifications; Resource Recovery; Secondary Control Techniques; Air Pollution Control Methods; Gas and Particle Removal Systems Used at Stationary Emission Sources: Design of particle holders, Absorption, Adsorption, Incineration, Condensation; Sulphur Oxides; Control of Nitrogen Oxides and Volatile Organic Compounds; Air Pollution Control at Combustion and Non-combustion Sources; Control of Motor Vehicle Emissions; Air Pollution Control Applications in Some Industrial Facilities; Economic Analysis of Control Technologies.

ÇEV431 Water Treatment Project 1+2 4.0

Project Planning: Site selection; Evaluation of Present and Future Conditions; Population Projections; Water Quantity: Fluctuations in water demand; Water quality; Water Supply: Ground and surface waters; Conveyance of Water and Connections; Selection of Units in a WTP Based on Water Characteristics; Design of WTP: Intake structures, Aeration and rapid mixing structures, Flocculation chambers, Sedimentation basins, Filtration beds, Disinfections units and others.

ÇEV432 Wastewater Treatment Project 1+2 4.0

Project Planning: Site selection, Work plans; Effluent Limits; Evaluation of Present and Future Conditions; Wastewater Parameters to be Considered in Design; Alternative Evaluation: Treatment, Land application, Disposal; Economics:

Selection of units in a WWTP based on wastewater characteristics; Design of a WWTP: Screens, Grit chambers, Primary sedimentation, Biological treatment, Disinfections, Sludge thickeners, Anaerobic treatment and others; Personnel Hygiene and Safety.

ÇEV438 Environmental Management 3+2 6.0

Main Shareholders and Criteria in Decision - making on Environmental Issues; Anthropocentric and Biocentric Approaches; Design of Environmental Regulations; Economic Valuation and Allocation of Environmental Resources; Public Involvement and Resolution of Disputes; Environmental Impact Assessment (EIA) Procedures: Command and control, Pollution discharge fee, Tradable permits; Air and Water Quality Management; Integrated Waste Management; Biological, Cultural and Socioeconomic Impacts of Projects; Environmental Risk Assessment; Strategic Environmental Assessment; Involvement of Geographical Information Systems in EIA Applications.

ÇEV442 Hazardous Waste Management 3+0 4.5

Fundamentals of Hazardous Waste Management: General definitions, Preparation of MSDS forms, National and international legislation, Fate and transport of contaminants; Toxicology and Risk Management: Toxic effects of hazardous wastes, Dose-response relationships; Pollution Prevention Practices: Management strategies, Life cycle analysis, Volume reduction, Toxicity reduction, Recycling processes; Treatment and Disposal Methods: Physico-chemical processes, Biological methods, Stabilization and solidification, Thermal methods, Landfilling; Case Studies on Industrial Waste Treatment.

ÇEV443 Water Reuse 2+0 3.0

Introduction; Planning for Wastewater Reclamation and Reuse; Public Health and Environmental Issues in Water Reuse; Importance of Water Reuse for the Future; Types of Reuse Applications: Urban reuse, Industrial reuse, Landscape irrigation and agricultural reuse, Groundwater recharge; Water Reclamation Technologies; Reclaimed Water Distribution and Storage; Risk Assessment of Reclaimed Water; Case Studies.

ÇEV444 Solid Waste Management Project 1+2 4.0

Principles of Municipal and Industrial Solid Waste Management Design: Waste amount, Composition and sources, Collection system, treatment/ disposal processes; National Legislation: Legal restrictions on selection and design of solid waste management system; Open Ended Design Problems: Software Application in Process Design; Collection Design; Material Recovery Facility Design; Recycling System Design; Composting Process Design; Incineration Plant Design; Landfill Design; Economic Analysis: Material and Energy Recovery; Investment; Operating costs; Industrial Solid Waste Management: Waste Minimization; Recovery.

ÇEV445 (Eng) Environmental Modeling 3+0 4.5

Mathematical Modeling in Environmental Sciences and Engineering; A General Overview of Model Development Process: Calibration and verification processes; Well-Mixed Systems: Steady and unsteady state conditions; Numerical Methods in the Modeling of Well-Mixed Systems; General Principles in Stream Modeling; Modeling of Streams: Wasteload Allocation; Streeter-Phelps Model: Aerobic and anaerobic conditions; Regression Models and Applications; Uncertainty Analysis: Perturbation. First order error analysis, Monte Carlo simulation; Widely Used Models: Watershed models (HSPF), Stream models (QUAL2EU), Ecological models, Climate models. Mathematical Modeling in Environmental Sciences and Engineering; A General Overview of Model Development Process: Calibration and verification processes; Well-Mixed Systems: Steady and unsteady state conditions; Numerical Methods in the Modeling of Well-Mixed Systems; General Principles in Stream Modeling; Modeling of Streams: Wasteload Allocation; Streeter-Phelps Model: Aerobic and anaerobic conditions; Regression Models and Applications; Uncertainty Analysis: Perturbation. First order error analysis, Monte Carlo simulation; Widely Used Models: Watershed models (HSPF), Stream models (QUAL2EU), Ecological models, Climate models.

ÇEV447 (Eng) Wastewater Engineering 3+0 4.0

Quantities and Characteristics of Wastewater: Physical, inorganic, nonmetallic, organic and biological characteristics; Screening, grit removal, sedimentation and flotation in wastewater treatment plants and their operational problems; Coagulation, flocculation and disinfection processes in wastewater treatment plants and their operational problems; Biological Wastewater Treatment: Suspended and fixed growth systems; Suspended growth process design and operational problems; Fixed growth process design and operational problems; Nutrient Removal: Nitrogen removal, Phosphorus removal, removal of nitrogen and phosphorus together; Anaerobic removal in wastewater treatment and its operational problems; Sludge treatment processes. Quantities and Characteristics of Wastewater: Physical, inorganic, nonmetallic, organic and biological characteristics; Screening, grit removal, sedimentation and flotation in wastewater treatment plants and their operational problems; Coagulation, flocculation and disinfection processes in wastewater treatment plants and their operational problems; Biological Wastewater Treatment: Suspended and fixed growth systems; Suspended growth process design and operational problems; Fixed growth process design and operational problems; Nutrient Removal: Nitrogen removal, Phosphorus removal, removal of nitrogen and phosphorus together; Anaerobic removal in wastewater treatment and its operational problems; Sludge treatment processes.

ÇEV448 (Eng) Coastal Zone Management 2+0 3.0

Characterization and Properties of Coastal Environments; Coastal Plains, Lagoons, Beaches; Ecological and Economic Importance of Coastal Areas; Coastal Features; Coastal Wave Climate: Cross shore and oblique waves, Near-shore currents; Coastal Erosion and its Effects; Precautions to Hinder Coastal Erosion; Pollutant Sources and Pollutant Types in the Coastal Environment ; Prevention of Coastal Pollution; Protection of Coastal Habitats.Characterization and Properties of Coastal Environments; Coastal Plains, Lagoons, Beaches; Ecological and Economic Importance of Coastal Areas; Coastal Features; Coastal Wave Climate: Cross shore and oblique waves, Near-shore currents; Coastal Erosion and its Effects; Precautions to Hinder Coastal Erosion; Pollutant Sources and Pollutant Types in the Coastal Environment ; Prevention of Coastal Pollution; Protection of Coastal Habitats.

ÇEV449 Graduation Project in Environmental Engineering I 1+2 3.0

Preliminary Research on the Topic Chosen under the Guidance of an Advisor; A Broad Literature Survey about the Topic; Preliminary Studies for Setting-up Laboratory Experiments; Design of Experimental Set-ups; Acquisition of Data for Theoretical and/or Modeling Studies; Determination of the Steps of the Study; Reporting the Results.

ÇEV450 Graduation Project in Environmental Engineering II 2+4 6.0

Theoretical and/or Experimental Works Related to the Chosen Topic under the Guidance of an Advisor; Reporting the Results; Presentation of the Results as a Poster; Oral Presentation before a committee.

ÇEV453 Environmental Ethics and Environmental Engineering 3+0 4.5

Basic Topics: Why philosophy?, An introduction to environmental philosophy, History of environmental utopias,Utopia and Thomas More, The country of sun and ve Tommasso Campanella; Science, Ethics and Environment: The history of civilization and development, Natural wealthes and natural sources, Dialectics of nature,The development and transmission on science and technology,Science and ethics; The Theory of Ethics and Environment: The rights of nature,The theory of future generations, The approaches on anthropocentricism and ecocentrism, The current approaches on ecology, Deep ecology, The philosophy of social ecology,Environmeantal science or ecology, Political ecology; Environmental Ethics and Environmental Engineering:The moral value of profession , Ethics for engineers, Environmental engineering and the ethical approaches on solution of environmental problems, The ethic codes on environmental engineering applications, Case studies and environmental ethics.

ÇEV457 Computer Aided Mapping at Engineering Science 3+0 4.5

Basic Map Knowledge: Map and Map types, Scale at map and scale types, Coordinates systems, Concepts related to the projection systems; Cartographic Map Design; Computer Aided Mapping: The hardware and software used at computer aided mapping; CAD systems and Mapping; Software Introduction; Basic Map Drawing Commands; CAD Based Data Generation; Data Editing; Planning Applications with CAD Systems: Drinking water project planning, Waste water and storm water project drawing, design, analysis and modeling.

ÇEV459 (Eng) Principles of Biological Treatment 3+0 4.0

Microbial Groups; Microbial Metabolism and Growth: Enzymes and enzyme kinetics, Metabolism, Growth kinetics; Role of Microorganisms in Biogeochemical Cycles: Microbiology of nitrification and denitrification and their kinetics, Microbiology of the phosphorus cycle, Enhanced biological phosphorus removal, Microbiology of the sulfur cycle; Pathogens and Parasites in Wastewater; Water and Wastewater Treatment Microbiology: Biology of activated sludge, Bulking and foaming in activated sludge plants, Attached microbial growth, Waste stabilization ponds, Sludge microbiology, Anaerobic digestion of wastewater and sludge.Microbial Groups; Microbial Metabolism and Growth: Enzymes and enzyme kinetics, Metabolism, Growth kinetics; Role of Microorganisms in Biogeochemical Cycles: Microbiology of nitrification and denitrification and their kinetics, Microbiology of the phosphorus cycle, Enhanced biological phosphorus removal, Microbiology of the sulfur cycle; Pathogens and Parasites in Wastewater; Water and Wastewater Treatment Microbiology: Biology of activated sludge, Bulking and foaming in activated sludge plants, Attached microbial growth, Waste stabilization ponds, Sludge microbiology, Anaerobic digestion of wastewater and sludge.

ÇEV461 Green Engineering Design and Sustainability 3+0 4.5

"Green" Engineering Approach to Product and Process Design: Minimization of environmental and health impacts, Design techniques that minimize pollution and cost; Pollution Prevention: Macroscale (life-cycle analysis-assessments, design, cost analysis), Mesoscale (unit operations design and flowsheet analysis), and Microscale (molecular level); Case Studies.

ÇEV462 Computer Aided Engineering Design 3+0 4.5

Two Dimensional Drawing for Engineers; Descriptions of the GUI (Graphical User Interface) and Hardware of the Software (AutoCAD), the Interaction with Other Softwares; The Logic of the AutoCAD; Pull Down Menu Commands for Two Dimensional Drawing (2D): File (New, Open, Save etc.), Format (Layer, Text Style, Dimension Style, Point Style etc.), Tools (Attributes, Drafting Settings etc.), View (Zoom, Pan, Toolbars etc.) and Draw (Line , Arc, Hatch, Block etc.), Modify (Erase, Move, Ofset, Array, Divide, Trim, Chamfer etc.) and Insert (Block, Raster Image), Dimension (Linear, Align, Radius, Leader etc.) Pull Down Menus; Object Snap (OSNAP), Object Selection Methods.

ÇEV462 (Eng) Computer Aided Engineering Design 3+0 4.5

Two Dimensional Drawing for Engineers; Descriptions of the GUI (Graphical User Interface) and Hardware of the Software (AutoCAD), the Interaction with Other Softwares; The Logic of the AutoCAD; Pull Down Menu Commands for Two Dimensional Drawing (2D): File (New, Open, Save etc.), Format (Layer, Text Style, Dimension Style, Point Style etc.), Tools (Attributes, Drafting Settings etc.), View (Zoom, Pan, Toolbars etc.) and Draw (Line, Arc, Hatch, Block etc.), Modify (Erase, Move, Offset, Array, Divide, Trim, Chamfer etc.) and Insert (Block, Raster Image), Dimension (Linear, Align, Radius, Leader etc.) Pull Down Menus; Object Snap (OSNAP), Object Selection Methods.

ÇEV463 Quality Management Systems in Environmental Engineering 3+0 4.5

Definitions and Goals of an Environmental Management System: Structure of ISO 14001 Environmental Management System, Environmental policy, Environmental procedures; Definitions and Goals of Occupational Health and Safety Management System: Structure of OHSAS 18001 Management System, OHSM policy and procedures, Risk assessment, Emergency plans, Monitoring and measurement; General Definitions in the Laboratory Accreditation Process; Fundamentals of TS EN ISO/IEC 17025; Coverage of TS EN ISO/IEC 17025: Reference standards and/or documents, Terms and definitions, Management essentials, Technical essentials; Accreditation Practices: Preparation of documents.

ÇEV464 (Eng) Industrial Hygiene and Work Safety 2+0 3.0

Epidemiological Studies, Safety Engineering and Risk Management Principles; Safety Engineering; Public Health and Occupational Diseases; Ergonomics and Work Psychology; Regulatory Measures; Industrial Accidents and Engineering System Failures: Emergency action plans; Transportation, Storage and Handling of Hazardous Materials; Dose-Response Relationships; Chronic and Acute Exposures; Cost-Risk-Benefit Analysis; Work and Environmental Health Relationships. Epidemiological Studies, Safety Engineering and Risk Management Principles; Safety Engineering; Public Health and Occupational Diseases; Ergonomics and Work Psychology; Regulatory Measures; Industrial Accidents and Engineering System Failures: Emergency action plans; Transportation, Storage and Handling of Hazardous Materials; Dose-Response Relationships; Chronic and Acute Exposures; Cost-Risk-Benefit Analysis; Work and Environmental Health Relationships.

ÇEV465 Sludge Treatment and Disposal 3+0 4.5

Principals of Sludge Management: Definitions and sludge sources, National and International Legislation, Physical, Chemical and biological properties of sludge; Main contaminants in sludge; Sludge Treatment and Disposal Methods: Sludge stabilization, Sludge thickening, Dewatering, Conditioning, Pathogen removal from sludge; Final Disposal Methods: Thermal methods, Landfilling, Land disposal.

ÇEV466 Ecological Planning and Ecotechnology 2+0 3.0

Deformations of Balance in Ecosystems; Problem of Energy; Impacts of Increasing Population, Urbanization and Industrialization on Nature; Protection of Biodiversity and Natural Areas; Agricultural Problems; Nutritional Problems; Impacts of Polluting Sources to Biotic and Abiotic Environment; Environmental Planning; Environmental Health; Assessment of Alternative Environmental Projects; Investigations of Scientific and Ethic Problems for a Good Environment in the Future.

ÇEV467 (Eng) Environmental Exposure Assessment 3+0 4.5

Introduction to Exposure Assessment: Exposure, Exposure dimensions, Exposure routes, Exposure pathways; Exposure Assessment Methods: Direct methods, Indirect methods; Questionnaires in Exposure Assessment; Personal Exposure Measurements; Biological Monitoring; Exposure Modeling: Environmental modeling, Probabilistic exposure modeling, Geographic information systems applications; Case Studies in Exposure Assessment.

ÇEV468 Watershed Management 2+0 3.0

Introduction: Concepts of watershed management, Current issues in water management, Characteristics of effective watershed management; Watershed Inventory: Physical features and landforms, Climate, Soil characteristics, Streamflow, Groundwater, Water quality, Land use; Developing Management Options: Identifying the sources, Types of options, Constraints and criteria; Simple Assessment Methods; Detailed Assessment Methods.

ÇEV469 Water and Wastewater Treatment Using Membrane Systems and Processing 3+0 4.5

Introduction to Membrane Systems; Structures and Characteristics of Membranes; Membrane Modules and Types; Membrane Module Configurations; Mass Transfer with Membrane Processes; Module Design and Characteristics; Concentration Polarization and Pollution Models; Microfiltration; Ultrafiltration; Nanofiltration; Reverse Osmosis and Advanced Osmosis; Pervaporation; Electro-dialysis; Industrial applications.

ÇEV471 Noise Pollution and Control 2+1 4.5

Basic Phonetics and Acoustic Parameters; Sound Power Level and Pressure Calculations; Noise Concept and Its Impact on Human Health; Noise Indicators; Propagation of Sound in Open Space; Indoor Sound Spreading; Noise Measurement Methods: Use of measuring equipment and devices, Determination of measurement points, Determination of correct measurement conditions; Determination of Noise Level; Society's Response to Noise; Noise Control; Quiet Areas; Legal Regulations for Noise and Control.

ÇEV472 Environmental Politics 3+0 4.5

Environment; Concept of Environment; Environmental Problems and the Relationship Between Environment and Human Beings; Concept of Politics and Environmental Politics; Intellectual Trends that Affect the Improvement of Environmental Politics; Political Environmental Science: Liberal-Capitalist Politics, Marxist Environmental Politics, Ecosocialism; Environmental Concept in International Area and Improvements: Globalization and Environment; Environmental Rights; Environmentalism; Environmental Actions; Environmental Management and Politics; Environmental Management and Organization in Turkey; Environmental Politics in Turkey; Urbanization and Environment; Industrialization and Environment.

ÇEV474 (Eng) Environmental Reactions and Reactor Kinetics 3+0 4.5

Mole Balance and Rate Expressions for Homogeneous and Heterogeneous Chemical Reactions; Effects of Physical Conditions: Temperature, Pressure, Chemical composition on reaction rates; Conversion and Reactor Sizing, Isothermal Reactor Design ; Mass Transport and Process Models; External Diffusion Effects on Heterogeneous Reactions; Kinetics of Biochemical Reactions and Microbial Processes. Mole Balance and Rate Expressions for Homogeneous and Heterogeneous Chemical Reactions; Effects of Physical Conditions: Temperature, Pressure, Chemical composition on reaction rates; Conversion and Reactor Sizing, Isothermal Reactor Design ; Mass Transport and Process Models; External Diffusion Effects on Heterogeneous Reactions; Kinetics of Biochemical Reactions and Microbial Processes.

ÇEV475 Environmental Legislation I 2+0 3.0

Constitution of the Turkish Republic; Laws, Environmental Law and Its Aim; Whole Legal Texts on Environment in Turkey; Regulations, Directives, Circulars; Regulation on Water Pollution and Control; Directive on Sampling and Methods of Analysis; Directive on Administrative Methods; Directive on Technical Methods; Regulation Concerning the Quality of Surface Waters Intended for Use as a Drinking Water Supply; Directive on Urban Wastewater Treatment; Directive on Recreational Waters.

ÇEV476 Environmental Legislation II 2+0 3.0

National and European Union Legislation on Wastes; Regulation on Waste Framework; Regulation on the Control of Solid Wastes; Regulation on the Control of Hazardous Wastes; Regulation on the Control of Healthcare Wastes; Regulation on the Control of Hazardous Chemical Substance and Products; Regulation on Packaging and Packaging Wastes; Regulation on Special Wastes: PCB and PCT, Waste oils, Vegetable waste oils, Waste battery and accumulators, End of life tires; Regulation on the Control of Construction and Demolition Wastes; Regulation on Alternative Fuels Derived from Wastes.

ÇEV478 Atmospheric Chemistry 3+0 4.5

Introduction: Description of the atmosphere, Composition of air, Importance of atmospheric reactions; Greenhouse Effect: Greenhouse gases, Sources of Greenhouse gases, Radiation balance on the earth; Stratospheric Ozone: Discovery, Formation, Chapman reactions; Tropospheric Ozone: Formation, Reactions; Photochemical Smog; Acid Rain: Formation and fates of inorganic and organic acids in the troposphere; Atmospheric Aerosols: Definition of aerosol, Importance of aerosols, Chemistry of aerosols; Atmospheric Semivolatile Organic Compounds.

ÇEV480 Air Pollution Meteorology and Atmospheric Dispersion 3+0 4.0

Basic Information about Meteorology; Vertical Stratification in the Atmosphere; Tropospheric Meteorology and Air Pollution; Atmospheric Stability Classification; Micrometeorology: Mixing height, Relationship between wind and height, Boundary layer, Meteorological measurements; Atmospheric Diffusion Theories; Calculations Related to Atmospheric Diffusion: Gaussian dispersion equation, Other analytical solutions, Plume rise; Atmospheric Particles and Aerosols: Size distributions, Aerosols and visibility, Aerosols and climate; Deposition; Atmospheric Chemical Transport Models; Frequently Used Models: Meteorological models, Chemical models, Combined models; Statistical Models.

ÇEV482 Air Pollution Laboratory 1+2 3.0

Sampling, Analysis and Evaluation Techniques in Air Pollution Monitoring; Sampling Techniques in Ambient Air; SO₂-PM Measurement; NO₂ Measurement; Automatic Measurement Systems (CO, NO_x, O₃): Operation principles, Calibration, Operation of the air quality monitoring station; Sampling of Atmospheric Constituents with Denuder and Their Secondary Analysis; Sampling and Analysis of Particles at Different Sizes; Measurement of Meteorological Parameters; Sampling and Analysis of Organic Compounds; Isokinetic Sampling of Flue Gas; Orsat Analysis; Indoor Sampling with Personal Samplers and Analysis of the Constituents; Evaluation of the Data and Report Writing.

ÇEV484 Small-scale Wastewater Treatment Systems 2+0 3.0

Introduction to Decentralized Wastewater Management Systems and Their Management; Constituents in Wastewater; Introduction to Process Analysis and Design; Wastewater Pretreatment Operations and Processes; Alternative Wastewater Collection Systems; Biological Treatment and Nutrient Removal; Lagoon Treatment Systems; Wetlands and Aquatic Treatment Systems; Land Treatment Systems; Packed-Bed Filters; Effluent Disposal for Decentralized Systems; Biosolids and Septage Management.

ÇEV486 Industrial Wastewater Treatment 3+0 4.0

Fundamentals of Industrial Wastewater Treatment; Basic Industries and Their Wastewater; Textile Industry Wastewater and Their Treatment; Radioactive Liquid Waste Treatment; Agricultural Industries and Their Wastewater; Purification of Salty Water, Removal of Oily Wastewater, Removal of Blood and Protein, Refinery Wastes and Their Treatment, Metal Plating Wastes; Chemical Plant Wastes; Food Industry Wastes; Treatment of Pharmaceutical Wastes: Waste Recovery and Control; Operational Problems. Fundamentals of Industrial Wastewater Treatment; Basic Industries and Their Wastewater; Textile Industry Wastewater and Their Treatment; Radioactive Liquid Waste Treatment; Agricultural Industries and Their Wastewater; Purification of Salty Water, Removal of Oily Wastewater, Removal of Blood and Protein, Refinery Wastes and Their Treatment, Metal Plating Wastes; Chemical Plant Wastes; Food Industry Wastes; Treatment of Pharmaceutical Wastes: Waste Recovery and Control; Operational Problems.

ÇEV488 Landfill Design 3+0 4.0

Introduction; National and International Regulations; Projection of Population and Prediction of Solid Waste Amounts; Determination of Landfill Capacity; Site Selection: Techniques used for site selection, Geographic information systems, Multi-criteria decision making techniques; Design of Liner and Cover Systems; Prediction of Leachate and Landfill Gas Production; Management of Leachate and Landfill Gas; Planning of Landfill Closure; Economic Analysis of Landfill. Introduction; National and International Regulations; Projection of Population and Prediction of Solid Waste Amounts; Determination of Landfill Capacity; Site Selection: Techniques used for site selection, Geographic information systems, Multi-criteria decision making techniques; Design of Liner and Cover Systems; Prediction of Leachate and Landfill Gas Production; Management of Leachate and Landfill Gas; Planning of Landfill Closure; Economic Analysis of Landfill.

ÇEV489 Advanced Treatment of Water and Wastewater I 3+0 4.0

Advanced Oxidation; Fenton Oxidation; Ultraviolet Oxidation; Photo-catalytic Oxidation; Oxidation with Ozone; Electrochemical Treatment: Fundamental definitions and laws in electrochemistry, Electrocoagulation, Electroflotation; Membrane Processes: Introduction to membranes, Membranes, Fundamentals of the process, Ultrafiltration; Nanofiltration; Reverse Osmosis; Electrodialysis. Advanced Oxidation; Fenton Oxidation; Ultraviolet Oxidation; Photo-catalytic Oxidation; Oxidation with Ozone; Electrochemical Treatment: Fundamental definitions and laws in electrochemistry, Electrocoagulation, Electroflotation; Membrane Processes: Introduction to membranes, Membranes, Fundamentals of the process, Ultrafiltration; Nanofiltration; Reverse Osmosis; Electrodialysis.

ÇEV490 Advanced Treatment of Water and Wastewater II 3+0 4.0

Ultrasound: Cavitation, Origin of sonochemical effect, Parameters that affect cavitation, Ultrasonic power measurement, Environmental application of ultrasound; Adsorption for Wastewater Treatment; Factors Affecting Adsorption; Adsorption Equilibria; Adsorbents: Production and properties of activated carbon; Fixed-Bed Adsorbents; Equilibrium in Ion-Exchange; Ion-Exchange Materials; Ion-Exchanger Design. Ultrasound: Cavitation, Origin of sonochemical effect, Parameters that affect cavitation, Ultrasonic power measurement, Environmental application of ultrasound; Adsorption for Wastewater Treatment; Factors Affecting Adsorption; Adsorption Equilibria; Adsorbents: Production and properties of activated carbon; Fixed-Bed Adsorbents; Equilibrium in Ion-Exchange; Ion-Exchange Materials; Ion-Exchanger Design.

ÇEV492 Air Quality Management Project 1+2 4.0

Urban and industrial air quality management: Preparation of emission inventories; Preparation of clean air plans and solutions of open-ended problems related to energy saving and pollution reduction strategies at industrial plants; Choice of the best against alternatives regarding criteria like cost, applicability, etc.

ÇEV494 Environmental Auditing 2+1 4.5

Environmental Auditing and Consultancy Relation; Environmental Auditing and Purpose; Types of Environmental Auditing; Audit Procedure: Preparation, Site visit, Evaluation and reporting; Quality Management in Auditing; Exemplary Audit or Consultancy Practices on Sectoral Basis; Legal Regulations for Auditing; Environmental Monitoring; Planning of the program, Air / Water / Soil monitoring, Waste monitoring, Noise monitoring.

ÇEV496 Microbiological Treatment Methods 2+0 3.0

Introduction to Biological Treatment: Basic Features, Advantages and disadvantages; Fundamentals of Microbiological Treatment: Definition of microbiological metabolism, Nutrient requirement in microorganism growth, Carbon and energy sources, Nutrient and trace element requirement, Effect of environmental conditions on biological reaction, Growth kinetics of microorganisms; The Role of Macro and Microorganisms in Biological Treatment; Biological Processes Used in Wastewater Treatment; Biological Processes Used in Air Pollution Control; Biological Processes Used in Solid Waste Treatment; By-products of Biological Treatment and Application Areas: Application examples.

ÇEV498 Health-Care Waste Management 2+0 3.0

Definition and Characterization Waste Resulted from Health-Care Facilities: Health-care wastes, Hazardous wastes, Radioactive wastes, municipal solid wastes; Health-Care Waste Management System Creation in Health-Care Facilities; Environmental impacts of health-care wastes; Legislative of Health-Care Wastes; Health-Care Waste Management: Segregation, Collection, Transportation and Temporary storage; Health-Care Waste Treatment and Disposal Methods: Steam treatment, Microwave treatment, Dry-heat treatment, Chemical treatment, Incineration; Management of Liquid Health-Care Wastes; Cost of Health-Care Wastes Management: Cost elements and cost analysis.

EEM102 (Eng) Introduction to Electrical Engineering 4+2 7.5

Electrical Engineering Profession; Electrical Charge, Current, Potential, Energy and Power; Resistance and Ohm's Law; DC Voltage, Current and Power Measurements: DC voltmeter, Ammeter, Ohmmeter and Wattmeter; Oscilloscopes; Linear Circuit Elements; Kirchoff's Laws; Loop and Node Analysis; Superposition; Thevenin and Norton Equivalent Circuits; Alternating Current Circuits; Sinusoidal Input Function; Phasor Concept; Steady-state Response to Sinusoidal Input; Average Power; Complex Power; Mutual Inductance and Transformers; AC Measurements; AC Power Calculations and Measurements; Polyphase Circuits; Semi-conductors: Diodes and transistors, Basic electronic circuits; Fields of Electrical Engineering.

EEM104 (Eng) Professional Aspects of Electrical & Electronics Engineering 2+0 3.0

Elektrik-Elektronik Mühendisliği Bölüm Tanıtımı, Mühendislik mesleği, Mühendislik etiğinin toplumsal önemi, Mühendislik uygulamalarının evrensel ve toplumsal boyutlarda etkileri, Teknolojik gelişmeler, Yaşam boyu öğrenmenin gerekliliği, Girişimcilik.

EEM206 (Eng) Electrical Circuits Laboratory 1+2 3.0

Short Circuit, Open Circuit, Serial and Parallel Connections; Power Calculation; Voltmeter Loading; Thevenin's Theorem; Computer Aided Circuit Analysis; RL and RC Circuits; Resonance Circuits; Unit Step and Pulse Response of Linear Circuits; OPAMP Circuits; Active Filters; Unit Step and Pulse Response of Non-Linear Circuits; Frequency Response of RL, RC, RLC and OPAMP Circuits. Short Circuit, Open Circuit, Serial and Parallel Connections; Power Calculation; Voltmeter Loading; Thevenin's Theorem; Computer Aided Circuit Analysis; RL and RC Circuits; Resonance Circuits; Unit Step and Pulse Response of Linear Circuits; OPAMP Circuits; Active Filters; Unit Step and Pulse Response of Non-Linear Circuits; Frequency Response of RL, RC, RLC and OPAMP Circuits.

EEM208 (Eng) Electromagnetic Fields and Waves 4+0 7.0

Vector Analysis; Electrostatic and Magnetostatic Fields; Ampere's Law; Magnetic Circuits; Vector Magnetic Potential; Quasi-static Electromagnetic Fields; Dielectric and Magnetic Materials; Faraday's Law; Electromagnetic Energy and Forces; Electromotive Force and Potential; Boundary-Value Problems; Maxwell Equations; Wave Propagation; Plane Waves; Reflection; Refraction; Polarization; Radiation. Vector Analysis; Electrostatic and Magnetostatic Fields; Ampere's Law; Magnetic Circuits; Magnetic Potential Vector; Quasi-static Electromagnetic Fields; Dielectric and Magnetic Materials; Faraday's Law; Electromagnetic Energy and Forces; Electromotive Force and Potential; Boundary-Value Problems; Maxwell Equations; Wave Propagation; Plane Waves; Reflection; Refraction; Polarization; Radiation.

EEM209 (Eng) Circuit Analysis 4+1 7.5

Transient Response: RL and RC circuits, Natural and forced response, Unit step response; RLC circuits; Complex Frequency; Frequency Response; Filters: Low-pass filters, Band-pass filters, High-pass filters, Quality factor; Bode Plots: Drawing Amplitude and Phase Graphs; Operational Amplifiers; Two-Port Circuits; Fourier Series; Fourier Transform and its Applications in Circuit Analysis; Application of Laplace Transform in Circuit Analysis.

EEM210 (Eng) Fundamentals of Semiconductor Device 3+0 5.0

Wave-Particle Duality: Blackbody radiation, Photoelectric Effect, X-Ray diffraction, Compton Effect, de Broglie Waves; Uncertainty Principle, Bohr Model of the Atom, Energy Levels and Spectra, Atomic Excitation, The Laser; Introduction to Quantum Mechanics: Schrödinger Equation, Particle in a Box, Finite Potential Well, Tunneling Effect, Harmonic Oscillator; 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; Bipolar Devices: The Transistor Action, Modes of Operation, Frequency Response; Unipolar Devices: Metal-Semiconductor Contacts, JFET, MESFET, MOS Diode, MOSFET; Modern Fabrication and Experimental Techniques.

EEM214 (Eng) Electrical Engineering for Mechanical Engineers 3+0 3.5

Principles and Components of Electrical Circuits; Variables of Circuit Elements and Measuring Devices; Kirchoff's Laws; Circuit Analysis Techniques; Nodal Analysis; Electronic Analog and Digital Systems; Three-phased Circuits; Digital and Analog Building Blocks; Elements of Power Electronics and Circuits; Electric Machines; Transformers, Synchronous and asynchronous machines, Direct current machines.

EEM232 (Eng) Digital Systems I 4+0 7.0

Number Systems; Logic Gates; Designing Binary Systems using Gates; Boolean Algebra; Karnaugh Maps; Combinational Circuit Analysis and Design; Hardware Description Language (HDL); Basic MSI (Middle scale integrated) Devices: Decoder, Encoder, Multiplexer, Demultiplexer, Binary adder (Half adder, full adder); Binary Arithmetic; Sequential Logic Concept and Design: Latch and flip-flop, State diagrams and state tables, Sequential circuits with D flip-flops, J-K flip-flops and R-S flip-flops; Registers and Counters; Memory and Programmable Logic Devices: Static/dynamic RAM modules.

EEM238 (Eng) Digital Systems Laboratory 0+2 2.0

Introduction to Logic Gates (Basic Boolean algebra with gates); Timing Consideration of a Gate; Voltage Transfer Characteristics; Fan-out, Fan-in Concepts; Implementation of a Problem with Sum of Products and Product of Sums; Combinational Circuit Design with MSI Devices; 4-bit Adder/Subtractor Circuitry Design; Synchronous Sequential Logic Design Experiment (Counter design); Data Bus and Register Transfer Experiment; Memory Experiment.

EEM301 (Eng) Signals and Systems 4+0 7.0

Discrete and Continuous Time Signals; Causality; Static / Dynamic, Discrete / Continuous Time, Linear / Non-linear, Time Varying / Invariant Systems; Laplace, Z, Fourier and Discrete Fourier Transforms; Modeling and Responses of Linear and Time Invariant Discrete and Continuous Time Systems; Differential Equations and Difference Equations; State Variables and State Equations; Impulse Response; Convolution; Transfer Functions; Realization of Transfer Functions; Computer Simulations; Fourier Analysis of Discrete and Continuous Time Systems; Sampling and Reconstructing.

EEM305 (Eng) Signals and Systems 3+0 4.5

Discrete and Continuous Time Signals; Causality; Static / Dynamic, Discrete / Continuous Time, Linear / Non-linear, Time Varying / Invariant Systems; Laplace, Z, Fourier and Discrete Fourier Transforms; Modeling and Responses of Linear and Time Invariant Discrete and Continuous Time Systems; Differential Equations and Difference Equations; State Variables and State Equations; Impulse Response; Convolution; Transfer Functions; Realization of Transfer Functions; Computer Simulations; Fourier Analysis of Discrete and Continuous Time Systems; Sampling and Reconstructing.

EEM308 (Eng) Introduction to Communications 3+2 6.5

Fourier Series, Fourier transforms; Power, Energy, Autocorrelation function, Power spectral density; Sampling; Hilbert Transforms, Lowpass representations of bandpass signals and systems; DSB-SC, DSB, SSB, VSB Amplitude Modulation, Amplitude modulators and demodulators; PLL; Angle Modulation: Frequency modulation (FM) and phase modulation (PM); Spectral Characteristics of Angle-Modulated Signals, Effective bandwidth, Carson's rule; Angle Modulators and Demodulators, Random processes: WSS processes, Gaussian and white processes, Noise equivalent bandwidth, Bandpass processes; Effect of Noise on Analog Communication Systems; Pre-Emphasis and De-Emphasis Filtering.

EEM310 (Eng) Control Systems 3+0 7.0

Introduction: Definition and classification of systems, Control Systems; Input-output Modeling of Linear Time-Invariant (LTI) Systems; Solution to the State Equations of LTI Systems; Modeling Electromechanical systems; Discrete-time Equivalents of Continuous-time Systems; Stability; Feedback Control Design for Stability; Steady-state Errors; Transient Response of LTI Systems; The Root-Locus Method; Introduction to Discrete-time Systems; Sampled-Data Systems.

EEM311 (Eng) Principles of Energy Conversion 3+2 7.0

Electromagnetic Circuits; Properties of Ferromagnetic Materials; Single-phase Transformers; Three-phase Transformers; Per Unit System; Principles of Electromagnetic Energy Conversion; Analysis of Singly or Multiply Excited Linear Systems; Analysis of Singly or Multiply Excited Rotational Systems; DC Machines: Generators, Motors, and Speed control. Electromagnetic Circuits; Properties of Ferromagnetic Materials; Single-phase Transformers; Three-phase Transformers; Per Unit System; Principles of Electromagnetic Energy Conversion; Analysis of Singly or Multiply Excited Linear Systems; Analysis of Singly or Multiply Excited Rotational Systems; DC Machines: Generators, Motors, and Speed control.

EEM321 (Eng) Electronics I 3+0 5.0

Diodes; Diode Applications; Zener Diodes; BJT Transistors; Common Emitter, Common Collector, Common Base Connections; Field Effect Transistors (FET); DC Analysis of Transistors; Thermal Effect and Stability Analysis; BJT Equivalent Circuits; FET Equivalent Circuits; Small Signal Analysis; Low Frequency Amplifiers; Frequency Response of Amplifiers; Input-Output Impedances. Diodes; Diode Applications; Zener Diodes; BJT Transistors; Common Emitter, Common Collector, Common Base Connections; Field Effect Transistors (FET); DC Analysis of Transistors; Thermal Effect and Stability Analysis; BJT Equivalent Circuits; FET Equivalent Circuits; Low Signal Analysis; Low Frequency Amplifiers; Frequency Response of Amplifiers; Input-Output Impedances.

EEM322 (Eng) Electronics II 3+0 5.0

Feedback Amplifiers: Series voltage, Series current and Parallel current feedback circuits; Frequency Response of Feedback Amplifiers; Operational Amplifiers (OPAMP); OPAMP Applications; Active Filters; Differential Amplifiers; Transistor Models at High Frequencies; High Frequency Response of Amplifiers; Multistage Amplifiers; Power Amplifiers (classes A,B and C); Oscillators. Feedback Amplifiers: Serial voltage, Serial current and Parallel current feedback circuits; Frequency Response of Feedback Amplifiers; Operational Amplifiers (OPAMP); OPAMP Applications; Active Filters; Differential Amplifiers; High Frequency Models of Transistors; High Frequency Response of Amplifiers; Multistage Amplifiers; Power Amplifiers (classes A,B and C); Oscillators.

EEM328 (Eng) Electronics Laboratory 1+2 3.0

Diode Characteristics; Examination of Various Diode Circuits; BJT Characteristics; Examination of Various BJT Circuits; FET characteristics; Examination of various FET circuits; Common Emitter / Source, Common Collector/Drain, Common Base/Gate Amplifiers; Frequency Response of Amplifiers; Differential Amplifiers; OPAMP Circuits; Design and Applications of Amplifiers with OPAMP.

EEM334 (Eng) Digital Systems II 3+0 5.0

Asynchronous Sequential Logic; Register Transfer Language and its Related Hardware Design; Design of a Basic Computer Datapath and its Connection to Register Bank; Sequencing of Register Transfer Operations; ASM (Algorithmic State Machine) Approach and Design Fundamentals; Designing Single Clock Cycle and Multiple Clock Cycle Computer; Instruction Set Architecture Concept: Addressing modes, Architectures, Instruction Types; Comparing Two Different CPU Designs: CISC and RISC; CISC and RISC Design Fundamentals.

EEM336 (Eng) Microprocessors I 3+2 7.0

8 Bit Microcontrollers; Command Subsets and Machine Language; Index Modes; Program Structure and Design; Advanced Programming in Assembler Language (Indexing; Arithmetic Operations; Bit and Byte Manipulation; Stacks; Subroutines; Loops); Fundamentals of the Design of Systems with Microprocessors; Memory Decoding; Data/Address/Control Buses; Input / Output Hardware; Interrupt Logic; Parallel Input / Output Interfaces; A/D and D/A Operations; Serial Communication Interfaces; Interrupt Hardware; Real Time Clock; Program Timer; Error Recovery Operations with COP Timers.

EEM342 (Eng) Fundamentals of Control Systems 3+2 7.0

Analysis of Discrete- and Continuous-time Control Systems Using Transfer Functions and State Variables; Stability; Transient Response; System Types and Steady State Errors; P, PI, PD, and PID Controls; Root Locus; Discrete- and Continuous-time Controller Design Using Root Locus; Hybrid Systems and Computer Controlled Analogue Systems; Discrete-time Controller Design for Continuous-time Systems.

EEM403 (Eng) Fundamentals of Optoelectronics and Nanophotonics 3+0 5.0

Wave Optics: Maxwell's wave equation, Fresnel's equations, Light waves in a homogeneous medium, Total internal reflection, Interference and optical resonators; Dielectric Waveguides and Optical Fibers: Planar slab and rectangular waveguides, Dispersion in waveguides, Optical fibers; Semiconductor Devices: Direct and indirect bandgap semiconductors, Pn junction, Light emitting diodes and lasers, Photovoltaic devices, Photodetectors; Photonic Crystals: One- and two- dimensional periodic nanostructures, Principles of nanoplasmonics. Wave Optics: Maxwell's wave equation, Fresnel's equations, Light waves in a homogeneous medium, Total internal reflection, Interference and optical resonators; Dielectric Waveguides and Optical Fibers: Planar slab and rectangular waveguides, Dispersion in waveguides, Optical fibers; Semiconductor Devices: Direct and indirect bandgap semiconductors, Pn junction, Light emitting diodes and lasers, Photovoltaic devices, Photodetectors; Photonic Crystals: One- and two- dimensional periodic nanostructures, Principles of nanoplasmonics.

EEM407 (Eng) Digital VLSI Design 2+2 5.0

Introduction: MOS transistor theory, Circuit design, Simple CMOS gates; CMOS Processing Technology: Manufacturing steps, Design rules; Standard CMOS Circuits: Standard circuit synthesis, Circuit design using Euler method; VLSI CAD Tools: Introduction to VLSI CAD tools, Circuit drawing and analysis using Magic, Circuit simulation; Circuit Characterization: Analytical delay estimation methods, Transistor sizing, Logical effort method; Complex Circuit Design: Combinatorial circuit design, Sequential circuit design, Circuit timing, Interconnections, I/O structures; System Design: Design strategies, Standard cell designs, Library- based circuit synthesis. Introduction: MOS transistor theory, Circuit design, Simple CMOS gates; CMOS Processing Technology: Manufacturing steps, Design rules; Standard CMOS Circuits: Standard circuit synthesis, Circuit design using Euler method; VLSI CAD Tools: Introduction to VLSI CAD tools, Circuit drawing and analysis using Magic, Circuit simulation; Circuit Characterization: Analytical delay estimation methods, Transistor sizing, Logical effort method; Complex Circuit Design: Combinatorial circuit design, Sequential circuit design, Circuit timing, Interconnections, I/O structures; System Design: Design strategies, Standard cell designs, Library- based circuit synthesis.

EEM409 (Eng) Random Signals 3+0 5.0

Correlation of Signals; Energy and Power Spectral Densities; Hilbert Transform; Principles of Modulation; Stochastic Processes: Characterization, Correlation functions, Stationarity, Ergodicity, Auto-correlation sequence, Power spectral density; Transmission of Random Signals Through Linear Systems; Special Stochastic Processes; Gaussian Processes; White Gaussian Noise; Band-limited Random Processes and Their Properties; Examples in Communications and Other Fields. Correlation of Signals; Energy and Power Spectral Densities; Hilbert Transform; Principles of Modulation; Stochastic Processes: Characterization, Correlation functions, Stationarity, Ergodicity, Auto-correlation sequence, Power spectral density; Transmission of Random Signals Through Linear Systems; Special Stochastic Processes; Gaussian Processes; White Gaussian Noise; Band-limited Random Processes and Their Properties; Examples in Communications and Other Fields.

EEM413 (Eng) Electrical and Electronics Engineering Design Project I 1+5 3.0

Engineering Design Methodology; Problem Statement Involving Feedback Control Systems, Digital Signal Processing, Software and Systems, Digital System Design, VLSI Design, Robotics and Computer Vision, Electronic Circuits, Microelectronic Processing, Optoelectronics, Microwave Circuits and Power Systems; The Specification of the Requirements; Concept Generation and Evaluation; The Functional Design and Test; Grouping and Team Work; Effective Communication in a Teamwork Environment; Capstone Project Proposal Presentation and Proposal Writing.

EEM414 (Eng) Electrical and Electronics Engineering Design Project II 1+5 6.0

Embodiment of the Design Process Involving Feedback Control Systems, Digital Signal Processing, Software and Systems, Digital System Design, VLSI Design, Robotics and Computer Vision, Electronic Circuits, Microelectronic Processing, Optoelectronics, Microwave Circuits, Power Systems; Incorporation of Realistic Engineering Constraints; Cost Estimation and Manufacturability; Completion of a Team Project; Final Report Writing; Presentation.

EEM415 (Eng) Engineering Design and Research 2+0 3.0

Engineering Design Process: Elements of the design process; Project Selection and Needs Identification: Engineering design projects, Project feasibility and selection criteria, Needs identification, The research survey, Needs and objectives statements; The Requirements Specification: The requirements setting process, Engineering requirements; Concept Generation and Evaluation: Creativity; Teams and Teamwork: Definition of team, Models of team development, Characteristics of real teams; Project Management: Network diagrams, Gantt charts, Cost estimation; Oral Presentations: Evaluation criterias of presentations.

EEM417 (Eng) Engineering Computations 3+1 5.0

Application of numerical analysis and optimization methods, A brief overview of Matlab, Solution of Equations of a Single Variable, Curve fitting (Approximation), interpolation, regression methods and application with Matlab, Numerical differentiation and its applications, Numerical integration and its applications, Ordinary differential equations - numerical solution methods to initial value problems, Ordinary differential equations - numerical solution methods to boundary value problems, Introduction to linear programming and Simplex Method, Introduction to unconstrained nonlinear programming, Modern optimization methods - Genetic Algorithms, Simulated Annealing and Particle Swarm Optimization

EEM418 (Eng) Introduction to Digital Integrated Circuits 3+0 5.0

Manufacturing Process: Manufacturing and Packaging of Integrated Circuits; CMOS Logic-Gate Circuits: Switch-Level Transistor, The CMOS Inverter, General Structure of CMOS Logic, The Two-Input NOR Gate, The Two-Input NAND Gate, A Complex Gate, CMOS Layout Designs; Digital Logic Inverters: The Voltage-Transfer Characteristic (VTC), Noise Margins, Inverter Implementation; Dynamic Operation of the CMOS: Inverter, the Propagation Delay, the Equivalent Load Capacitance; Transistor Sizing: Transistor Sizing in CMOS Logic Gates, Driving a Large Capacitance; Power Dissipation: Sources of Power, Dissipation, Power-Delay and Energy-Delay Products; Digital IC Technologies: Logic-Circuit Families, Design Methodologies, Logic-Circuit Families.

EEM444 (Eng) Object Oriented Design 3+0 5.0

Introduction: Preprocessing commands, Basic structures; Object Oriented Model: Objects and classes, Fields and methods, Enumerations; Memory Control: Constructors and destructors, New and delete operators; Object Oriented Concepts: Information hiding, Encapsulation, Inheritance, Polymorphism, Operator overloading, Exception handling, try - catch blocks; OO Paradigms: Templates, Iterators, Vectors; Method Types: Virtual functions, Inline functions, Function overriding, Function pointers; Advanced Topics: Multithreading, Controlling critical sections, Semaphores, Atomic operations.

EEM446 (Eng) Cryptographic Hardware Design 3+0 5.0

Introduction to Cryptography: Symmetric-key cryptography, Public-key cryptography, Cryptographic hash functions; Computer-Aided Cryptographic Engineering; Digital System Design: Combinational and sequential logic design, Hardware description languages (HDLs), Reconfigurable logic devices, Design of computer systems and components; Metrics for Security in Embedded Systems; Cryptographic Hardware Architectures: Basic building blocks for cryptographic hardware, Hardware design for block ciphers, stream ciphers, and asymmetric cryptography, Design examples, High-performance and efficient design of cryptographic primitives.

EEM447 (Eng) Research in Digital Systems I 1+4 5.0

Network protocols; Optimization of network protocols; Developing network applications; System-on-chip fundamentals; System-on-chip hardware design; System-on-chip software design; Embedded system hardware design; Embedded system software design; Application development on real time operating systems; Mobile software applications; Low power RF system design; Hardware applications on FPGA. Network protocols; Optimization of network protocols; Developing network applications; System-on-chip fundamentals; System-on-chip hardware design; System-on-chip software design; Embedded system hardware design; Application development on real time operating systems; Mobile software applications; Low power RF system design.

EEM448 (Eng) Research in Digital Systems II 1+4 5.0

Network protocols; Optimization of network protocols; Developing network applications; System-on-chip fundamentals; System-on-chip hardware design; System-on-chip software design; Embedded system hardware design; Embedded system software design; Application development on real time operating systems; Mobile software applications; Low power RF system design; Hardware applications on FPGA.

EEM449 (Eng) Embedded System Design 2+2 5.0

Embedded systems, development cycle of embedded systems, design requirements of embedded systems; ARM architecture and programming; interface design, ADC/DAC; timers, interrupts; ARM microcontroller system design, oscillators, reset circuits, DC-DC conversion; PCB design, line driver design, memory interfacing; communication, inter chip communication, network programming, TCP/IP communication, Ethernet; RF communication, RF interface circuits; real-time operating systems, real-time programming, multithreaded programming, process synchronization; graphical user interface, Qt programming.

EEM450 (Eng) Introduction to System Identification 3+0 5.0

System identification; Stochastic vs. non-stochastic formulation; Evaluation of algorithms; Random variables and stochastic processes; Signals and systems and related topics; Model parameterization and prediction; impulse and step responses; Correlation methods and spectral analysis; Least-squares estimation; Determining model dimension; Commonly used signals; Spectral properties; Persistent excitation; Consistency; Biase; Minimizing prediction errors; Convergence and consistency; The instrumental-variable methods; Kalman filter interpretation; Aliasing due to sampling; Closed-loop data; Model-order estimation.

EEM451 (Eng) Industrial Control Systems 1+4 5.0

Control applications in Industry: Fundamental controller types, Process control; Automation systems; Relays; Programmable Logic Controllers (PLC); Working principles of PLCs; Programming PLCs: logic operations, timer operations, counter operations, comparator operations, math operations, Implementing Control Laws in PLC: P, PI, PID controllers; Common elements in Process Control: Sensors, Transducers, Data acquisition systems, Signal conditioning circuits; Fundamental sensors and actuators in Robotic Systems.

EEM452 (Eng) Introduction to Robotics 3+0 5.0

Fundamental components of robotic systems; Spatial Descriptions and Transformations; Kinematics: Direct and inverse kinematics; Manipulator Dynamics: Lagrangian formulation, Newton-Euler Formulation; Trajectory generation: Trajectory generation in joint space versus operational space, Dynamic scaling of trajectories; Motion control: Control Feedback and Closed loop control; Interaction control: Position and force control; Sensors and actuators.

EEM453 (Eng) Research in Control and System Theory I 1+4 5.0

System Definition and Properties; Stochastic and Deterministic Systems; Linear and Nonlinear Systems; Continuous and Discrete Time Systems; Chaotic Systems; Finite and Infinite Dimensional Systems; System Modelling; Uncertain Systems, System Identification Methods; Stability Analysis of Linear and Nonlinear Systems; Performance Specifications of Controllers; Theoretical and Application Based Control Problems.

EEM454 (Eng) Research in Control and System Theory II 1+4 5.0

Feedback systems; Controller design approaches for finite dimensional systems; Robust controllers; Stable controllers; Proportional-integral-derivative controllers; Controller design approaches for infinite-dimensional systems; Petri nets; Synchronization problems; Consensus problems; Real time control applications.

EEM455 (Eng) Research in Power Systems I 1+4 5.0

Principles of Energy Conversion; Power Systems; Energy Transmission Lines; Three and Single Phase Circuits; Power Calculations and Control; Compensation Techniques; Power Electronics; Motor Driver Circuits and Speed Control; Electrical Machinery; Machine and Motor Characteristics; High Voltage; Electrostatic Fields and Field Strength Control; Overvoltage; Test Methods and Coordination of Isolation; Electrical Installation Systems; Parameter Calculation; Power Quality Subjects.

EEM456 (Eng) Research in Power Systems II 1+4 5.0

Power Electronics; Motor Driver Circuits and Speed Control; Electrical machinery; Machine and Motor Characteristics; High Voltage; Electrostatic Fields and Field Strength Control; Overvoltage; Test Methods and Coordination of Isolation; Principles of Energy Conversion; Power Systems; Energy Transmission Lines; Three and Single Phase Circuits; Power Calculation and Control; Compensation Techniques; Electrical Installation Systems; Parameter Calculation; Power Quality Subjects; Software and/or Hardware Applications.

EEM457 (Eng) Research in Signal Processing I 1+4 5.0

Introduction to Advanced Signal Processing Techniques; Introduction to Signal Detection and Parameter Estimation Methods: Classical Approach; Bayesian Approach; Modern Signal Modelling Techniques; Spectrum Estimation: Nonparametric Methods, Parametric Methods; Spread Spectrum Communications; Introduction to Array Signal Processing; Direction of Arrival Estimation Techniques and Systems; Signal Localization; Introduction to Radar Signal Processing.

EEM458 (Eng) Research in Signal Processing II 1+4 5.0

An elective course offered by the related faculty for individual research and development progress of the student: Problem Definition; Signal Modelling; Defining the Problem Solution with Signal Processing Techniques; Simulation Studies; Performance Comparison; Interpretation of the Results; Design and Implementation; Verification of the Results; Fine Tuning; Testing the Designed System; Reporting Final Results.

EEM459 (Eng) Research in Electronics I 1+4 5.0

Solid State Semiconductor Material Properties: Optoelectronic; Thermoelectrical; Optical and Similar Characteristics; Solid State Semiconductor Material Applications; Thin Film Growth Methods; Thin Film Characterization Methods; Micro and Nanofabrication Techniques of Devices; Theoretical and Applied Optoelectronics; Characterization and Measurement Techniques of Optoelectronic Devices; Optoelectronic Device (Lasers, Solar Cells, etc.) Operation Principles.

EEM460 (Eng) Research in Electronics II 1+4 5.0

Solid State Semiconductor Material Properties: Optoelectronic; Thermoelectrical; Optical and Similar Characteristics; Thin Film Growth Methods; Thin Film Characterization Methods; Micro and Nanofabrication Techniques of Devices; Theoretical and Applied Optoelectronics; Characterization and Measurement Techniques of Optoelectronic Devices; Optoelectronic Device (Lasers, Solar Cells, etc.) Operation Principles.

EEM461 (Eng) Research in Telecommunications I 1+4 5.0

Applications of Analog and Digital Modulation Techniques; Implementation of Amplitude Modulation; Angle modulation; Pulse Amplitude Modulation; Phase Shift Keying; Quadrature Amplitude Modulation; Frequency Shift Keying and Realization of Other Modulation Variants; Source Coding Applications; Implementation of Huffman Codes and Lempel-Ziv Codes; Channel Coding Applications; Linear Block Codes; Implementation of Convolutional Codes; Mobile Communications Applications; Radar Systems; Satellite Communications.

EEM462 (Eng) Research in Telecommunications II 1+4 5.0

Applications of Analog and Digital Modulation Techniques; Implementation of Amplitude Modulation; Angle modulation; Pulse Amplitude Modulation; Phase Shift Keying; Quadrature Amplitude Modulation; Frequency Shift Keying and Realization of Other Modulation Variants; Source Coding Applications; Implementation of Huffman Codes and Lempel-Ziv Codes; Channel Coding Applications; Linear Block Codes; Implementation of Convolutional Codes; Mobile Communications Applications; Radar Systems; Satellite Communications.

EEM463 (Eng) Introduction to Image Processing 3+0 5.0

2D Signals and systems; Digital images: Color, stereo and video images, Sampling and quantization of images; Binary images: Image binarization, Morphological operations; Image transforms; Linear and nonlinear filters; Spatial and frequency domain image enhancement; Image restoration; Image segmentation; Image coding and compression: Lossy and lossless compression; Image processing applications: Security and surveillance, Medical image processing.

EEM464 (Eng) System-on-Chip Design 2+2 5.0

System-on-Chip principles: Design methodologies, Design tools, Design flow, Design Reuse; HW/SW Co-design: Hardware acceleration, Interface design, Intellectual property (IP) block design, IP integration, Resource sharing, Pipelining in the design; Verification of System-on-chip: Testing; Zynq System: Processing system, Programmable logic, Interconnection networks, ARM AMBA AXI protocols; High-level-synthesis (HLS), Data types, Interface specification, Algorithm synthesis, Designing with Vivado HLS, IP generation; Operating Systems on Zynq; Designing a SoC with a soft-processor MicroBlaze.

EEM465 (Eng) Fundamentals of Data Communications 3+0 5.0

Probability and random variables; Measures of information: entropy, mutual information; The asymptotic equipartition property; Data Compression, Kraft inequality; Optimal Codes: Huffman codes; Universal compression, Lempel-Ziv coding; Algebraic concepts; Linear block codes; Cyclic codes; BCH and Reed-Solomon codes; Linear convolutional codes; Properties of convolutional codes; Applications. Probability and random variables; Measures of information: entropy, mutual information; The asymptotic equipartition property; Data Compression, Kraft inequality; Optimal Codes: Huffman codes; Universal compression, Lempel-Ziv coding; Algebraic concepts; Linear block codes; Cyclic codes; BCH and Reed-Solomon codes; Linear convolutional codes; Properties of convolutional codes; Applications.

EEM466 (Eng) High Voltage Techniques 3+0 5.0

Introduction; Electric Field; Insulators; Estimation and Control of Electric Stress; Surge Voltages; Conduction and Electrical Breakdown in Gases; Conduction and Electrical Breakdown in Liquids; Conduction and Electrical Breakdown in Solids; Applications of Insulating Materials; Generation of High Voltages and Currents; Measurement of High Voltages and Currents; Electrostatic Fields and Field Stress Control; Non-Destructive Insulation Test Techniques; Overvoltages, Testing Procedures and Insulation Coordination; Design and Testing of External Insulation.

EEM467 (Eng) Digital Communications 3+0 5.0

Signals, power of signals, FT, concepts of modulation, multiplexing (time, frequency and code), networks, allocation of frequency spectrum, noise analysis; Geometric representation of signals, BER analysis, MF detection; ISI, raised cosine spectrum, trellis diagrams, channel equalization; Channel capacity and coding, block codes, cyclic codes and convolutional codes. Signals, power of signals, FT, concepts of modulation, multiplexing (time, frequency and code), networks, allocation of frequency spectrum, noise analysis; Geometric representation of signals, BER analysis, MF detection; ISI, raised cosine spectrum, trellis diagrams, channel equalization; Channel capacity and coding, block codes, cyclic codes and convolutional codes.

EEM468 (Eng) Advanced Communication Techniques 3+0 5.0

Optical Communications; Ray Theory; Mod Propagation; Attenuation and Dispersion in Fibres; Inter Symbol Interference (ISI) and Doppler Effect in Wireless Communication; Channel Equalization; Coding; Block Codes; Cyclic Codes and Convolutional Codes; Trellis Diagrams; Spread Spectrum Techniques; Pseudo-Noise (PN) Sequences and Their Generations; Code Division Multiple Access (CDMA) Communication Protocol; Multipath Fading. Optical Communications; Ray Theory; Mod Propagation; Attenuation and Dispersion in Fibres; Inter Symbol Interference (ISI) and Doppler Effect in Wireless Communication; Channel Equalization; Coding; Block Codes; Cyclic Codes and Convolutional Codes; Trellis Diagrams; Spread Spectrum Techniques; Pseudo-Noise (PN) Sequences and Their Generations; Code Division Multiple Access (CDMA) Communication Protocol; Multipath Fading.

EEM469 (Eng) Communication Electronics 3+0 5.0

Analysis of Transmission Lines; Smith Chart; Impedance Matching of Distributed and Lumped Element Circuits; Distributed Resonator Circuits; Two Port Scattering Parameter Analysis; Filter Design by Insertion Loss Method; S-Parameters and RF Amplifiers; Oscillator Design; PLL and Frequency Synthesizers; Noise and Linearity Problems in Communication Systems; Receivers and Modulators; Detectors and Mixers. Analysis of Transmission Lines; Smith Chart; Impedance Matching of Distributed and Lumped Element Circuits; Distributed Resonator Circuits; Two Port Scattering Parameter Analysis; Filter Design by Insertion Loss Method; S-Parameters and RF Amplifiers; Oscillator Design; PLL and Frequency Synthesizers; Noise and Linearity Problems in Communication Systems; Receivers and Modulators; Detectors and Mixers.

EEM470 (Eng) Microwaves and Antennas 3+0 5.0

Electromagnetic Plane Waves; Antenna Parameters; Antenna Radiation Pattern; Antenna Gain; Antenna Efficiency and Impedance; Transmission Line Analysis; Antenna Effective Aperture; Friis Transmission Equations; Antenna Radiation Fields; Radiation Integrals and Auxiliary Potential Functions; Wire and Dipole Antennas; Short and Half Wave Dipole Antennas; Monopole Antennas; Monopole Antennas Above an Infinite Ground Plane; Loop Antennas; Antenna Arrays; Waveguides TEM, TE, and TM Modes; Parallel Plate Waveguide; Analysis of Waveguides with a Rectangular or Circular Cross-Section. Electromagnetic Plane Waves; Antenna Parameters; Antenna Radiation Pattern; Antenna Gain; Antenna Efficiency and Impedance; Transmission Line Analysis; Antenna Effective Aperture; Friis Transmission Equations; Antenna Radiation Fields; Radiation Integrals and Auxiliary Potential Functions; Wire and Dipole Antennas; Short and Half Wave Dipole Antennas; Monopole Antennas; Monopole Antennas Above an Infinite Ground Plane; Loop Antennas; Antenna Arrays; Waveguides TEM, TE, and TM Modes; Parallel Plate Waveguide; Analysis of Waveguides with a Rectangular or Circular Cross-Section.

EEM471 (Eng) Electrical Machinery I 2+2 5.0

DC Machines with Commutator; Structural Properties; Operational Concepts; Circuit Models of DC Machines; Series, Shunt and Compound Machines; Structural Properties; Rotating Field Theory; Circuit Models of Synchronous Machines; Generator and Motor Operation Cases; Asynchronous Machines; Structural Properties; Circuit Models of Asynchronous Machines; Performance Calculations; Speed Control Techniques and Motor Characteristics. DC Machines with Commutator: Structural Properties; Operational Concepts; Circuit Models of DC Machines; Series, Shunt and Compound

Machines: Structural Properties; Rotating Field Theory; Circuit Models of Synchronous Machines; Generator and Motor Operation Cases; Asynchronous Machines: Structural Properties; Circuit Models of Asynchronous Machines; Performance Calculations; Speed Control Techniques and Motor Characteristics.

EEM472 (Eng) Electrical Machinery II 2+2 5.0

Operational Characteristics and Applications of Stepping Motors; Operation and Control of Linear Asynchronous Motors; Motors Used in Rail-way Traction Systems; Single-phase Machines; Capacitor-type Machines; Shaded Pole Machines; Permanent Magnet DC Machines and Speed Control; Starting Properties of Asynchronous Machines; Machines Used for Special Applications; Reluctance and Synchros; Linear Motors. Operational Characteristics and Applications of Step Motors; Operation and Control of Linear Asynchronous Motors; Motors Used in Rail-way Systems; Single-phase Machines; Capacitor-type Machines; Shaded Pole Machines; Permanent Magnet DC Machines and Speed Control; Starting Properties of Asynchronous Machines; Machines Used for Special Applications; Reluctance and Synchros; Linear Motors.

EEM473 (Eng) Power Systems Analysis I 3+0 5.0

Basic Theorems Used in Power Systems; Phasors; Complex Power; Symmetrical Components; Sequence Networks of Load and Rotating Machine Systems; Power Transformers; Transmission-Line Parameters; Differences of Transmission-Line Parameters due to Line Structure; Steady-State Analysis of Transmission-Lines, Equivalent pi Circuit, Maximum Power Flow, Reactive Compensation Techniques. Basic Theorems Used in Power Systems; Phasors; Complex Power; Symmetrical Components; Sequence Networks of Load and Rotating Machine Systems; Power Transformers; Transmission-Line Parameters; Differences of Transmission-Line Parameters due to Line Structure; Steady-State Analysis of Transmission-Lines, Equivalent Pi Circuit, Maximum Power Flow, Reactive Compensation Techniques.

EEM475 (Eng) Power Electronics I 3+0 5.0

Uncontrolled Diode Rectifiers; Phase-Controlled Rectifier and Inverter Circuits; Single-Phase and Three-Phase Inverters; DC Switched Converter and Inverter Circuits; Buck, Boost and Full-Bridge DC Converters; DC-AC Switched inverters; Resonance Converters; Basic Resonance and Load Resonance Converters; Direct Current Power Supplies; Computer Models of Power Electronics Circuits. Uncontrolled Diode Rectifiers; Phase-Controlled Rectifier and Inverter Circuits; Single-Phase and Three-Phase Inverters; DC Switched Converter and Inverter Circuits; Buck, Boost and Full-Bridge DC Converters; DC-AC Switched Inverters; Resonance Converters; Basic Resonance and Load Resonance Converters; DC Power Supplies; Computer Models of Power Electronics Circuits.

EEM476 (Eng) Power Electronics II 2+2 5.0

Direct and Alternative Current Motor Driver Systems; Equivalent Circuits; Permanent Magnet DC Servo-Drivers; Asynchronous Motor Drivers; Pulse Width Modulation with Variable Frequency and Square Wave Drivers; Industrial Applications of Power Electronics; Analysis of Current Harmonics; Harmonics Reduction Method; Direct Current Transmission-Lines; Snubber Circuits; SCR Circuits; Special Topics on Industrial Applications. Direct and Alternative Current Motor Driver Systems; Equivalent Circuits; Permanent Magnet DC Servo-Drivers; Asynchronous Motor Drivers; Pulse Width Modulation with Variable Frequency and Square Wave Drivers; Industrial Applications of Power Electronics; Analysis of Current Harmonics; Harmonics Reduction Method; Direct Current Transmission-Lines; Snubber Circuits; SCR Circuits; Special Topics in Industrial Applications.

EEM477 (Eng) Digital Signal Processing 3+0 5.0

Discrete Time Systems and Signals; Periodically Sampling, Reconstruction; Changing Sampling Frequency; Z-Transform; Inverse Z-Transform; Linear Time-Invariant Systems; Frequency Response; Systems Described by Difference Equations; Discrete System Functions; Zeros and Poles; Minimum Phase Systems; Graphical Representations of Difference Equations; FIR and IIR Systems; Lattice Structure; Filter Design Methods; Fast Fourier Transform. Discrete Time Systems and Signals; Periodical Sampling, Reconstruction; Changing Sampling Frequency; Z-Transform; Inverse Z-Transform; Linear Time-Invariant Systems; Frequency Response; Systems Described by Difference Equations; Discrete System Functions; Zeros and Poles; Minimum Phase Systems; Graphical Representations of Difference Equations; FIR and IIR Systems; Lattice Structure; Filter Design Methods; Fast Fourier Transform.

EEM478 (Eng) Digital Signal Processing Hardware 1+4 5.0

Digital Signal Processors (DSP); Fix Point Processors; Introduction to Texas Instruments TMS3205x Fix Point Processors; Memory Organization; ALU; Interrupts; Serial Ports; Direct Memory Access; C5x Programming; Fixed Point Code Optimisation; Introduction to Floating Point DSP Processors; T1 TMS320C3x Systems; ALU; Interrupts; Serial Ports; DMA; Sampling; Floating Point Programming and Optimisation. Digital Signal Processors (DSP); Fix Point Processors; Introduction to Texas Instruments TMS3205x Fix Point Processors; Memory Organization; ALU; Interrupts; Serial Ports; Direct Memory Access; C5x Programming; Fixed Point Code Optimisation; Introduction to Floating Point DSP Processors; T1 TMS320C3x Systems; ALU; Interrupts; Serial Ports; DMA; Sampling; Floating Point Programming and Optimisation.

EEM479 (Eng) Electrical Installation Systems 2+2 5.0

Rules and Standards of Electrical Installation Engineering; Safety of Electrical Installations; Motor, Heating and Illumination Load Connections; Calculations of Supplied Power and Maximum kVA Ratings; Illumination and Load

Distribution Factors; Illumination Calculations; Protection Methods Against Short Circuit and Extremely High Voltages; Power Factor Compensation Methods; Schedules and Energy Measurement; Grounding Methods; Distribution Panels; Determination of Conductor Size; Calculation of Voltage Drop; Sample Installation Projects and Project Applications.ules and Standards in Electrical Installation Engineering; Safety of Electrical Installations; Motor, Heating and Illumination Load Connections; Calculations of Supplied Power and Maximum kVA Ratings; Illumination and Load Distribution Factors; Illumination Calculations; Protection Methods Against Short Circuit and Extremely High Voltages; Power Factor Compensation Methods; Schedules and Energy Measurement; Grounding Methods; Distribution Panels; Determination of Conductor Size; Calculation of Voltage Drop; Sample Installation Projects and Project Applications.

EEM480 (Eng) Algorithms and Complexity 3+0 5.0

Mathematical Preliminaries to Define Complexity: Orders of magnitude, Recurrence relations, Time complexity, Space complexity; Recursive Algorithms; Abstract Data Types; Object Orienting Programming Preliminaries; Stacks and Queues; Analyzing of Sorting and Searching Algorithms; Trees: Binary trees search trees, Analysis of Insertion into trees and deletion from trees; Priority queues; Analysis of Hash Tables.Mathematical Preliminaries to Define Complexity: Orders of magnitude, Recurrence relations, Time complexity, Space complexity; Recursive Algorithms; Abstract Data Types; Object Orienting Programming Preliminaries; Stacks and Queues; Analyzing of Sorting and Searching Algorithms; Trees: Binary trees search trees, Analysis of Insertion into trees and deletion from trees; Priority queues; Analysis of Hash Tables.

EEM481 (Eng) Solid State Electronics 3+0 5.0

Semiconductors; Physical Properties of Semiconductors; Atomic Structure of Semiconductors; Energy Bands; Carrier Concentrations; PN-junction Elements; One Pole Elements; Double Pole Elements; Diodes; Bi-junction Transistors (BJT); Field Effect Transistors (FET); Fundamentals of Integrated Circuits; Integrated Circuits Design; Fundamentals of Production of Integrated Circuits.Semiconductors; Physical Properties of Semiconductors; Atomic Structure of Semiconductors; Energy Bands; Carrier Concentrations; PN-junction Elements; One Pole Elements; Double Pole Elements; Diodes; Bi-junction Transistors (BJT); Field Effect Transistors (FET); Fundamentals of Integrated Circuits; Integrated Circuits Design; Fundamentals of Integrated Circuits Production .

EEM482 (Eng) Fundamentals of Data Networks 3+0 5.0

Fundamentals of ISO Reference Model: Layered Structure in Networking; Physical Layer Fundamentals: Bit-rate, Baud-rate; Electrical Data Transfer Methods; Multiplexing; Data Link Layer Fundamentals: Basic protocols, Sliding window protocol and data transfer protocols, Fundamentals of rate-based control and algorithms, Examples of protocols; Network Layer Fundamentals: Datagram and virtual circuits; Routing Algorithms and Efficiency; Fundamentals of TCP/IP: Protocol layers, Packet addressing, Applications of TCP/IP; Socket Interface; Telnet; Ftp; E-mail.Fundamentals of ISO Reference Model: Layered Structure in Networking; Physical Layer Fundamentals: Bit-rate, Baud-rate; Electrical Data Transfer Methods; Multiplexing; Data Link Layer Fundamentals: Basic protocols, Sliding window protocol and data transfer protocols, Fundamentals of rate-based control and algorithms, Examples of protocols; Network Layer Fundamentals: Datagram and virtual circuits; Routing Algorithms and Efficiency; Fundamentals of TCP/IP: Protocol layers, Packet addressing, Applications of TCP/IP; Socket Interface; Telnet; Ftp; E-mail.

EEM483 (Eng) Power Systems Analysis II 2+2 5.0

Power Flow Calculations; Jacobi, Gauss and Newton-Raphson Solution Techniques; Symmetrical and Asymmetrical Short Circuits; Power Systems Controls ; General- Voltage Control; Load -Frequency Control; Transient Operation and Stability of Transmission Lines; Lossy and Lossless Lines; Multiconductor Lines; Insulation Coordination; Transient Model of Synchronous Machine.Power Flow Calculations; Jacobi, Gauss and Newton-Raphson Solution Techniques; Symmetrical and Asymmetrical Short Circuits; Power Systems Controls ; General- Voltage Control; Load -Frequency Control; Transient Operation and Stability of Transmission Lines; Lossy and Lossless Lines; Multiconductor Lines; Insulation Coordination; Transient Model of Synchronous Machine.

EEM484 (Eng) Integrated Circuit Design 3+0 5.0

Fundamentals of Design of Integrated Circuits; Design Techniques of Large Scale Integrated Circuits (LSI); Design Techniques of Very Large Scale Integrated Circuits (VLSI); Bi-Polar Integrated Circuits; MOS Technology and Logic; PMOS, NMOS and CMOS Technologies and Utilization of These Technologies in Integrated Circuits; Structural Design; Design Rules; Placement Methods; Computer Aided Integrated Circuit Design; Simulation of Integrated Circuits; Timing.Fundamentals Design of Integrated Circuits of ; Design Techniques of Large Scale Integrated Circuits (LSI); Design Techniques of Very Large Scale Integrated Circuits (VLSI); Bi-Polar Integrated Circuits; MOS Technology and Logic; PMOS, NMOS and CMOS Technologies and Utilization of These Technologies in Integrated Circuits; Structural Design; Design Rules; Placement Methods; Computer Aided Integrated Circuit Design; Simulation of Integrated Circuits; Timing.

EEM485 (Eng) Digital Electronic Circuits 3+0 5.0

Large Signal Transistor Models; TTL Logic Gates; MOS Logic Gates; CMOS Logic Gates; Inverters; Input and Output Circuits; NAND Gate; NOR Gate; Stability Analysis; Flip-Flops; Astable Multivibrators; Monostable Multivibrators; Bistable Multivibrators; Schmitt Triggers; Memories: RAM, ROM, EPROM, EEPROM; Analogue-Digital and Digital-Analogue Converters.Large Signal Transistor Models; TTL Logic Gates; MOS Logic Gates; CMOS Logic Gates; Inverters; Input and Output Circuits; NAND Gate; NOR Gate; Stability Analysis; Flip-Flops; Astable Multivibrators; Monostable

Multivibrators; Bistable Multivibrators; Schmitt Triggers; Memories: RAM, ROM, EPROM, EEPROM; Analogue-Digital and Digital-Analogue Converters.

EEM486 (Eng) Computer Architecture 3+0 5.0

Performance: Measuring performance, Performance metrics, SPEC benchmarks, Comparing and summarizing performance; MIPS Instruction Set Architecture; Arithmetic for Computers: ALU design, Integer multiplication and division, Floating point operations; The Processor: Single cycle datapath design, Controller design for a single cycle datapath, Multicycle datapath design, Controller design for a multicycle datapath; Pipelining: A pipelined datapath and its control, Data hazards and forwarding, Data hazards and stalls, Branch hazards; Caches: Basics of caches, Measuring and improving cache performance. Performance: Measuring performance, Performance metrics, SPEC benchmarks, Comparing and summarizing performance; MIPS Instruction Set Architecture; Arithmetic for Computers: ALU design, Integer multiplication and division, Floating point operations; The Processor: Single cycle datapath design, Controller design for a single cycle datapath, Multicycle datapath design, Controller design for a multicycle datapath; Pipelining: A pipelined datapath and its control, Data hazards and forwarding, Data hazards and stalls, Branch hazards; Caches: Basics of caches, Measuring and improving cache performance.

EEM489 (Eng) Microprocessors II 2+2 5.0

32 Bits Microprocessors; Motorola 68K Series; Command Subsets; Index Modes; 32 Bits Programming; 68K Hardware Elements; Data Buses; Address, Data and Control Buses; Interrupt Definition; Address Analysis; Direct Memory Access; Serial Communication; Digital to Analogue Conversion; Parallel Ports; Arithmetic Operations; Microprocessor Buses VME; General Microprocessor System Design.

EEM490 (Eng) Nonlinear Systems 3+0 5.0

Phase Plane Analysis: Constructing phase portraits, Phase plane analysis of nonlinear systems, Existence of limit cycles; Fundamentals of Lyapunov Theory: Equilibrium points, Concepts of stability, Linearization and local stability, Lyapunov's direct method, System analysis based on Lyapunov's direct method; Advanced Stability Theory: Concepts of stability for non-autonomous systems, Lyapunov analysis of non-autonomous systems, Instability theorems, Existence of Lyapunov functions, Positive linear systems and the passivity formalism, Absolute stability; Describing Function Analysis. Phase Plane Analysis: Constructing phase portraits, Phase plane analysis of nonlinear systems, Existence of limit cycles; Fundamentals of Lyapunov Theory: Equilibrium points, Concepts of stability, Linearization and local stability, Lyapunov's direct method, System analysis based on Lyapunov's direct method; Advanced Stability Theory: Concepts of stability for non-autonomous systems, Lyapunov analysis of non-autonomous systems, Instability theorems, Existence of Lyapunov functions, Positive linear systems and the passivity formalism, Absolute stability; Describing Function Analysis.

EEM491 (Eng) Linear Control Systems 3+0 5.0

Frequency Response of Linear Systems; Nyquist Criteria; Stability Margins; Lead and Lag Compensator Design; Sensitivity Analysis and Robust Control; Response of Linear Time - Varying Systems; Controllability and Observability; Controllable and Observable Modes; Stabilizability and Detectability; Kalman's Decomposition; Pole Placement by State Feedback; Observers; Pole Placement by Dynamic Output Feedback; Disturbance Rejection and Asymptotic Reference Signal Tracking; Servomechanism Problem. Frequency Response of Linear Systems; Nyquist Criteria; Stability Margins; Lead and Lag Compensator Design; Sensitivity Analysis and Robust Control; Response of Linear Time - Varying Systems; Controllability and Observability; Controllable and Observable Modes; Stabilizability and Detectability; Kalman's Decomposition; Pole Placement by State Feedback; Observers; Pole Placement by Dynamic Output Feedback; Disturbance Rejection and Asymptotic Reference Signal Tracking; Servomechanism Problem.

EEM493 (Eng) Digital Control Systems 3+0 5.0

Sampling and Reconstruction; Digital-Analog and Analog-Digital Conversions; Data Sampling Systems; Effect of Sampling Frequency on System Response and Choice of Sampling Frequency; Transient Response of Discrete Time Systems; Steady-State Response of Discrete Time Systems; Frequency Response of Discrete Time Systems; Multi-Rate Sampled Data Systems; Quantization Errors; Pole Placement; Observers; Performance Criteria; Optimal Control; Design of Dynamic Controllers. Sampling and Reconstruction; Digital-Analog and Analog-Digital Conversions; Data Sampling Systems; Effect of Sampling Frequency on System Response and Choice of Sampling Frequency; Transient Response of Discrete Time Systems; Steady-State Response of Discrete Time Systems; Frequency Response of Discrete Time Systems; Multi-Rate Sampled Data Systems; Quantization Errors; Pole Placement; Observers; Performance Criteria; Optimal Control; Design of Dynamic Controllers.

EEM494 (Eng) Control Systems Laboratory 1+4 5.0

Industrial Control Applications; Control System Design and Implementation for Examples of Industrial Systems; Analog Controller Design and Implementation for Linear and Non-Linear Systems; Digital Implementation of Analog Controllers; Digital Controller Design for Analog Systems; Choice of Sampling Frequency; Effect of Quantization Errors on System Performance; Utilization of Microprocessors and Programmable Logic Controllers in Control Applications. Industrial Control Applications; Control System Design and Implementation for sample Industrial Systems; Analog Controller Design and Implementation for Linear and Non-Linear Systems; Digital Implementation of Analog Controllers; Digital Controller

Design for Analog Systems; Choice of Sampling Frequency; Effect of Quantization Errors on System Performance; Utilization of Microprocessors and Programmable Logic Controllers in Control Applications.

EEM495 (Eng) Network Synthesis 3+0 5.0

System Function; Impulse Response of RC, RL, RLC and LC Circuits; Frequency Response of RC, RL, RLC and LC Circuits; Synthesis of RC Circuits; Synthesis of RL Circuits; Synthesis of RLC Circuits; Synthesis of LC Circuits; Ladder Circuits; Filters; Bandwidth and Quality Factor; Design and Realization of Low-Pass Filters; Design and Realization of Band-Pass Filters; Design and Realization of Band-Stop Filters; Computer Aided Circuit Synthesis. System Function; Impulse Response of RC, RL, RLC and LC Circuits; Frequency Response of RC, RL, RLC and LC Circuits; Synthesis of RC Circuits; Synthesis of RL Circuits; Synthesis of RLC Circuits; Synthesis of LC Circuits; Ladder Circuits; Filters; Bandwidth and Quality Factor; Design and Realization of Low-Pass Filters; Design and Realization of Band-Pass Filters; Design and Realization of Band-Stop Filters; Computer Aided Circuit Synthesis.

EEM496 (Eng) Communications Systems Laboratory 1+4 5.0

AM Modulation, DSB Modulation, SSB Modulation; Noise in AM Systems; Frequency Modulation; Transmitters - Receivers; FM Stereo Systems; Noise in FM Systems; PSK and FSK Modulation; Digital Communication Subsystems: Sampling, Quantization and Reconstruction; PCM and PWM Systems; Noise in Digital Systems; Coding; Troubleshooting. AM Modulation, DSB Modulation, SSB Modulation; Noise in AM Systems; Frequency Modulation; Transmitters - Receivers; FM Stereo Systems; Noise in FM Systems; PSK and FSK Modulation; Digital Communication Subsystems: Sampling, Quantization and Reconstruction; PCM and PWM Systems; Noise in Digital Systems; Coding; Troubleshooting.

EEM497 (Eng) Communication Systems I 3+0 5.0

Development of Analog and Digital Systems; Signals; Noise and Spectra; Fourier Transform; Random Processes; Power Spectral Density; Correlation Functions; Input and Output Relations in Linear Systems; Signal-to-Noise Ratio; Amplitude Modulation; Double Side Band Transmitter (DSB); Single Side Band Transmitter (SSB); Phase (PM) and Frequency Modulation (FM); Bilateral Phase-Shift Keying (BPSK); PSK; Frequency-Shift Keying (FSK), Frequency Division Multiplexing and FM. Development of Analog and Digital Systems; Signals; Noise and Spectra; Fourier Transform; Random Processes; Power Spectral Density; Correlation Functions; Input and Output Relations in Linear Systems; Signal-to-Noise Ratio; Amplitude Modulation; Double Side Band Transmitter (DSB); Single Side Band Transmitter (SSB); Phase (PM) and Frequency Modulation (FM); Bilateral Phase-Shift Keying (BPSK); PSK; Frequency-Shift Keying (FSK), Frequency Division Multiplexing and FM.

EEM498 (Eng) Communication Systems II 3+0 5.0

Historical Development of Digital Systems; Sampling Theorem; Binary Coding; Pulse-Amplitude Modulation; Pulse-Code Modulation; Sampling, Quantization, u-Law and A-Law of Coding Processes; Line Coding; Inter-Symbol Interference (ISI); Delta Modulation; Time-Division Multiplexing (TDM); Pulse-Width Modulation (PWM); Noise Effects on Digital Systems; Error Rate of Binary-Signals. Historical Development of Digital Systems; Sampling Theorem; Binary Coding; Pulse-Amplitude Modulation; Pulse-Code Modulation; Sampling, Quantization, u-Law and A-Law of Coding Processes; Line Coding; Inter-Symbol Interference (ISI); Delta Modulation; Time-Division Multiplexing (TDM); Pulse-Width Modulation (PWM); Noise Effects on Digital Systems; Error Rate of Binary-Signals.

ENM102 (Eng) Introduction to Industrial Engineering 2+0 3.0

Engineering: Industrial engineering, Definitions of task and progress, Topics in Industrial Engineering: Manpower, Capital, Technology Relations, Mutual interaction, Goods and Service Production, Company, Company types, Industrial company; Productivity: Productivity management, Labor study, Time study, Labor evaluation, Labor and Wage; Statistics; Quality and Quality Control; Ergonomics; Facility Planning; Operation Research; use computers in Industrial Engineering.

ENM104 (Eng) Introduction to Computation and Programming for Industrial Engineering 2+2 4.5

Introduction to Computer: History of computers, Components of computers; Fundamentals of Algorithms; Pseudocode and Flowcharts; Basic Elements of Programming; Branching Programs; String and Input; Iteration; Some Simple Numerical Programs; Functions, Scoping and abstraction; Structured Types: Tuples, Lists; Algorithm Design and Numerical Solutions of Some Industrial Engineering Problems.

ENM203 (Eng) Linear Programming 2+2 5.5

Methodology of Operations Research; Assumptions of Linear Programming; Modeling with Linear Programming; Graphical Solution; Simplex Algorithm; Big M Method; Two-Phase Simplex Algorithm; Revised Simplex Algorithm; Duality: Primal- dual relationship, Dual simplex algorithm; Sensitivity Analysis; Solution of Linear Decision Models with Computer Software. Methodology of Operations Research; Assumptions of Linear Programming; Modeling with Linear Programming; Graphical Solution; Simplex Algorithm; Big M Method; Two-Phase Simplex Algorithm; Revised Simplex Algorithm; Duality: Primal- dual relationship, Dual simplex algorithm; Sensitivity Analysis; Solution of Linear Decision Models with Computer Software.

ENM207 (Eng) Advanced Programming **2+2 4.5**
Review of the basic programming concepts; Stack Implementation; Multidimensional lists; Classes and Data Abstractions; Inheritance; Polymorphism; Sort algorithms; Search algorithms; NumPy module; SciPy module.

ENM212 (Eng) Integer Programming and Network Models **2+2 6.0**
Transportation Models: Transportation table; Assignment Models; Hungarian Algorithm; Network Models; Shortest Path Problem; Minimum Spanning Tree Problem; Maximum Flow Problem; Critical Path Problem; Dynamic Programming; Integer Programming; 0-1 Integer and Mixed Integer Programming; Branch and Bound Algorithm; Branch and Cut Approach; Solution of 0-1 Integer Programming Problems with Computer Software. Transportation Models: Transportation table; Assignment Models; Hungarian Algorithm; Network Models; Shortest Path Problem; Minimum Spanning Tree Problem; Maximum Flow Problem; Critical Path Problem; Dynamic Programming; Integer Programming; 0-1 Integer and Mixed Integer Programming; Branch and Bound Algorithm; Branch and Cut Approach; Solution of 0-1 Integer Programming Problems with Computer Software.

ENM214 Manufacturing Methods and Material Selection **3+2 5.0**
Specifications of Materials Used in Engineering: Geometrical, physical, mechanical (static and dynamic), chemical specifications; Engineering Material Selections According to Place; Lathing: Lathes leveling, Lathing processing, Cutting tools, Metal filings, Cutting power; Shape Slots; Processing Principles; Welding: Welding techniques, Oxygen welding, Electric arc welding; Grinding; Drill Holes; New Machining Processes; Automation (NC, CNC, CAD/CAM, CIM).

ENM301 Work Study **3+0 4.0**
Historical Development of Work Study; The importance of ergonomics in work study; concepts in Work study and method study; Work flow diagram, steps of work division and measurement; Determining standard time; Fatigue factor; Synthetic times (MTM, WF, MTA etc.), chronometer method; Applications of method study and work measurement.

ENM304 (Eng) Investment Planning and Analysis **4+0 6.0**
Investment Concepts in Types of investments; Preparation of investment projects; Evaluation of Investment Projects: Static, Dynamic and multi-criteria evaluation methods; Feasibility; Cost-Benefit Analysis; Optimum Investment Planning; Investments of Establishments and Individuals; Measurement of risk and gain; Stock and money exchange; Investment evaluation process and techniques; Comparison of investment alternatives; Portfolio Theory and its applications.

ENM306 (Eng) Stochastic Models **3+0 4.5**
Definition of Stochastic Processes; Markov Chain; Chapman-Kolmogorov Equations; Transition Matrices; Classification of States of Markov Chain; Queuing Theory; Exponential Distribution; Birth and Death Process; Queuing Models Involving Exponential Distribution; Queuing Models Involving Nonexponential Distribution; Analytical Solution Methods of Queuing Models; Priority Discipline Queuing Models; Queuing Networks; Queuing Systems. Definition of Stochastic Processes; Markov Chain; Chapman-Kolmogorov Equations; Transition Matrices; Classification of States of Markov Chain; Queuing Theory; Exponential Distribution; Birth and Death Process; Queuing Models Involving Exponential Distribution; Queuing Models Involving Nonexponential Distribution; Analytical Solution Methods of Queuing Models; Priority Discipline Queuing Models; Queuing Networks; Queuing Systems.

ENM307 (Eng) Simulation **2+2 6.0**
Methodology of Simulation; Simulation Models; Monte Carlo Simulation, Discrete and continuous time simulation; Selection of input probability distribution, Production of random numbers; Data analysis of a system output; Statistical comparison of similar systems. Model events; Introduction to simulation languages; Usage and application of SIMAN and ARENA.

ENM309 Industrial Information Systems **3+0 6.0**
Database; Introduction to Access Database: Commands, Properties, Table Properties, Construction of Tables, Data Processing; Access Programming, Combining Industrial Engineering Applications with database; Functional Structure Design Specification Methods: IDEF0 Method; Information Structure and Logical Database Design: IDEFIX Method, Design and Modeling Information Systems; Automated Data Collection Systems (SCADA, Barcode etc.) Integration of Information Systems with database used for production and control.

ENM310 Experiment Design and Regression Analysis **3+0 4.5**
Experiment Design and Analysis: Variance analysis with one factor, two factors, several factors; Hypothesis Tests for Significance of the Model; Model Adequacy Test; Comparisons Among Treatment Means; Simple and Multiple Linear Regression Analysis: Estimation of model parameters by least square methods and by matrix; Estimation of Standard Error; Hypothesis Tests for Significance of Regression; Hypothesis Tests for Significance of Regression Parameters; Residual Analysis; Polynomial Regression Models; Correlation; The Coefficient of Determination; Selection of Variables in Multiple Regression: Forward selection, Backward elimination, Stepwise selection; 2k factorial design and analysis.

ENM312 Manufacturing Systems Analysis 3+0 5.0

Introduction and Basic Concepts; Evaluation of Manufacturing Systems: Overall system performance, Evaluation criteria in manufacturing, Modeling and simulation of manufacturing systems, Analysis of production lines, Assembling and line balancing; Design of Manufacturing Systems; Computer Integrated Manufacturing Systems: NC, CNC and DNC systems; Parts Programming; Introduction to CAD/CAM Systems: Computer aided quality (CAQ) systems, Robots and analysis of robotics; Operation of Systems; Trends in Manufacturing Systems: Modern manufacturing technologies, Principles of group technology and cellular manufacturing, Factory of the future.

ENM313 Mathematical Programming Models in Engineering 3+0 4.5

Introduction to Linear Programming: Problem statement, Basic definitions, Linear programming, Problem in standard form, Basic solutions, Sensitivities, Duality; Understanding the Set of all Feasible Solutions; Convex Sets: Linear spaces, Polyhedral convex cones, Polytopes, Polyhedra; Bounded and Unbounded LPP: Models and GAMS package, Transportation problem, Production scheduling problem, Diet problem, Network flow problem, Portfolio problem, The 0-1 knapsack problem, Academy problem and school timetable problem, Identifying relevant symptoms, Models of discrete location.

ENM315 (Eng) Nonlinear Programming 2+2 6.0

Nonlinear Programming; Convex Function; Concave Function; Convex Set; One-Variable Unconstrained Models; Bisection Method; Newton Method; Multivariable Unconstrained Optimization; Gradient Search Method; Multivariable Constrained Optimization; Karush-Kuhn-Tucker Conditions; Convex Programming; Frank-Wolfe Algorithm; Sequential Unconstrained Minimization Technique (SUMT). Nonlinear Programming; Convex Function; Concave Function; Convex Set; One-Variable Unconstrained Models; Bisection Method; Newton Method; Multivariable Unconstrained Optimization; Gradient Search Method; Multivariable Constrained Optimization; Karush-Kuhn-Tucker Conditions; Convex Programming; Frank-Wolfe Algorithm; Sequential Unconstrained Minimization Technique (SUMT).

ENM317 Engineering Statistics 3+0 4.5

Data: Classified Data; Mean; Distribution Measurements; Sampling: Sampling error, Sampling distribution, t Distribution, F Distribution, Chi-Square test; Statistical Estimation: Estimation of population parameter, Point estimation, Confidence interval estimation; Hypothesis Testing: Hypothesis tests for means, proportions and variances, Hypothesis testing for small and large samples; Nonparametric Statistical Testing: Sign test, Sign test for large samples, Sign test for paired observation, Wilcoxon sign ranking test; Goodness of Fit: Test of Chi-Square, Kolmogorov-Smirnov test, Independence test, Homogeneity test.

ENM319 (Eng) Production and Operations Planning I 3+0 5.0

Common Concepts and Basic Definitions of Production and Operations Management; Forecasting: Qualitative forecasting techniques, Quantitative forecasting techniques, Forecasting errors; Sales and Operations Planning: Aggregate planning of capacity, Workforce planning; Service Operations Management; Push and Pull Production Control Systems: Lot sizing, Material requirements planning, Explosion calculus, Just in time production systems.

ENM320 (Eng) Production and Operations Planning II 3+0 5.0

Basic Concepts of Inventory Control; Inventory Control Subject to Known Demand: Economic order quantity model, Extensions of economic order quantity model, Quantity discount models; Inventory Control Subject to Uncertain Demand: Newsvendor model, (Q, R) model, Service levels; Supply Chain Management; Operations Scheduling: First come first served, Shortest processing time, Earliest due date, Critical ratio scheduling; Project Scheduling: CPM model, PERT model.

ENM407 (Eng) Systems Analysis 3+0 5.0

Introduction to Systems; System Engineering; Design of Conceptual Systems: Needs Analysis; Feasibility Analysis; Functional Analysis; Synthesis And Evaluation; System Specification; Preparing For System Design: Functional analysis of sub systems, Design parameters; Detailed System Design and Development: Detailed design needs, Combining system elements, Design engineering activities, Detail design equipment, Documentation of design and development of a prototype; Testing The Systems And Evaluation; System Analysis Tools; Alternatives And Models of Decision-Making; Or Economical Evaluation Models, Optimization of Design And Operations

ENM411 Facility Planning 3+0 4.5

Facility Location Selection; Numerical Analysis of Facility Location Problem; Analysis of Models; Facility Location Projects, Project Management Techniques; Design of Layout; Required Knowledge And Analysis; Activity Grouping And Department Designation. Material; Handling System; Determining Equipment, Manpower and Area Requirements; Computer Aided Facility Planning.

ENM411 (Eng) Facilities Planning 3+0 4.5

Facility Location Selection; Numerical Analysis of Facility Location Problem; Analysis of Models; Facility Location Projects, Project Management Techniques; Design of Layout; Required Knowledge And Analysis; Activity Grouping And Department Designation. Material; Handling System; Determining Equipment, Manpower and Area Requirements; Computer Aided Facility Planning.

ENM413 Planning and Scheduling in Manufacturing and Service Systems 3+0 4.0

Introduction to Scheduling: Manufacturing models and service models; Exact Optimization Methods and Heuristic Solution Techniques; Project Planning and Scheduling; Machine Scheduling and Job Shop Scheduling; Economic Lot Scheduling; Scheduling and Timetabling in Sports; Timetabling in Educational Systems; Planning, Scheduling and Timetabling in Transportation; Workforce Scheduling.

ENM413 (Eng) Planning and Scheduling in Manufacturing and Service Systems 3+0 4.0

Introduction to Scheduling: Manufacturing models and service models; Exact Optimization Methods and Heuristic Solution Techniques; Project Planning and Scheduling; Machine Scheduling and Job Shop Scheduling; Economic Lot Scheduling; Scheduling and Timetabling in Sports; Timetabling in Educational Systems; Planning, Scheduling and Timetabling in Transportation; Workforce Scheduling.

ENM415 (Eng) Design, Creativity and Innovation 3+0 4.5

Industrial design basic concepts; Design theories and methods: practical solutions, solve the problem; Design of product; Creativity; Innovation: conversion to the profitable product/ service, relationship of marketing; Creativity Methods; converting the creativity opinion to the innovation; Intellectual Property: patent, register of design; Entrepreneurship: job scheduling, government aid, challenges and risks; Management of the innovation.

ENM419 (Eng) Sustainable Systems Engineering 3+0 5.0

Definition, History and Basic Concepts of Sustainability; Life Cycle Assessment; Carbon Footprinting; Carbon Regulations and Carbon Pricing; Waste Management and Waste Regulations; Green Inventory Management and Facility Location; Closed-Loop Supply Chains; Corporate Social Responsibility; Responsible Sourcing, Case Studies Related to Sustainability Initiatives in Industries.

ENM420 Service Systems 3+0 4.5

Definition of Service Systems; Fundamental Components; Properties of Service Systems; Operation Characteristics in Service Systems; Queue models; Quality in Service; Customer Fidelity; Performance Criterion in Service Systems.

ENM421 Introduction to Data Science 2+1 4.5

Introduction: What is data science? Applications of Python Libraries in Data Science: Data manipulation, Data analysis, Data visualization and interpretation; Data Collection from Different Sources, Cleaning and Preprocessing; Types of Machine Learning: Regression, Classification, Clustering and Python applications; Text Processing Applications; Recommendation Systems Applications; Image Processing Applications.

ENM426 (Eng) Ergonomics 3+0 4.5

Concept of Ergonomics; Human Body: Movement systems, Nervous systems, Perceptive organs, Energy needs; Practical Anthropometrics; Environment at the Work Place: Temperature, Humidity, Air Activities, Lighting, Noise, Vibration; Relation Between Ergonomics And Work Study; Components of Human-Machine Systems; Principles of Ergonomics At Work; Engineering Anthropometrics; Role of Ergonomics On Quality And Productivity; Energy Needed During work.

ENM427 Special Topics in Industrial Engineering 1+2 5.0

Basic Techniques in Industrial Engineering: Work analysis, Engineering economy, Statistical quality control, Production planning and control, Material handling, Production models, Decision models and analysis, Statistical analysis techniques; Application of These Techniques to Manufacturing Problems; Analysis of Methods and Results.

ENM428 Industrial Engineering Applications 2+4 8.0

Preliminary Research on the Topic Chosen under the Guidance of an Advisor; Literature Survey about the Topic; Data Collection and Analysis; Theoretical and/or Experimental Works about the Chosen Topic; Reporting the Results; Presentation of the Results; Oral Presentation.

ENM430 Cognitive Ergonomics 3+0 4.5

Introduction to human factors; Human Information Processing; Visual and Auditory Sensory Systems; Cognition; Memory; Attention and Perception; Decision Making; Mental Workload; Human Error; Situational Awareness; Stress; Motivation and Job Satisfaction; Potential Applications of Cognitive Ergonomics. Introduction to human factors; Human Information Processing; Visual and Auditory Sensory Systems; Cognition; Memory; Attention and Perception; Decision Making; Mental Workload; Human Error; Situational Awareness; Stress; Motivation and Job Satisfaction; Potential Applications of Cognitive Ergonomics.

ENM431 Advanced Production Systems 3+0 4.5
Definition of production system; Traditional and Group Technology Production Systems; New Production Systems: Lean Production Systems and Toyota Philosophy; Learning to see, Value Stream Map , TAKT time, Group Technology, Cellular Production System, Flexible Manufacturing System, Agile Production System; Concept of Constraints, Green Production, Recycle approach.

ENM432 Lean Thinking and Lean Manufacturing Management 3+0 4.5
Manufacturing Systems; History of Manufacturing Systems; 7 base muda's; Muda's caused production activities ; What is the important non value added activities; How many techniques will be used to remove mudas; Value; Value Flow; Value Flow Maps; Kanpan; One piece flow; TAKT Time; Labor efficiency; Inventory reducing; Lean Six sigma Phases Manufacturing Systems; History of Manufacturing Systems; 7 base muda's; Muda's caused production activities ; What is the important non value added activities; How many techniques will be used to remove mudas; Value; Value Flow; Value Flow Maps; Kanpan; One piece flow; TAKT Time; Labor efficiency; Inventory reducing; Lean Six sigma Phases

ENM435 Engineering Seminars I 0+2 1.0
Series of seminars where industrial engineers working at service and manufacturing sectors and academicians at national and international universities share their knowledge and experience with students.

ENM437 (Eng) Structural Equation Modeling 3+0 4.5
Structural Equation Models: Terminology and Application Areas; Basic Theory of Principal Components Analysis, Exploratory and Confirmatory Factor Analyses and Their Applications; Path Analysis; Models with Only Manifest Variables; Models With Latent Variables and General Models; Model Specification; Model Identification and Model Estimation; Evaluation and Development of Models: Model fit indices, Model testing and model modifications; Application Tools and Techniques of Structural SEM.

ENM440 (Eng) Introduction to Data Mining 3+0 4.5
Introduction; Data: Types of data, Data preprocessing, Measures of similarity and dissimilarity; Exploring Data: The iris data set, Summary statistics, Visualization, OLAP and multidimensional data analysis; Classification: Basic concepts, Decision trees, Model evaluation, Nearest-neighbor classifiers, Bayesian classifiers, Artificial neural network (ANN), Support vector machine (SVM), Multiclass problems; Association Analysis: Basic concepts, Frequent item set generation; Cluster Analysis: Basic concepts, K-means, Cluster evaluation; Anomaly Detection: Statistical approaches, Clustering-based techniques.

ENM442 (Eng) Decision Analysis 3+0 4.5
Decision Theory; Classification of Decision Problems; Decision Environments: Decision-making under uncertainty, Decision-making under risk; Utility Theory: Axioms of utility theory; Decision Trees: Use of decision trees under certainty, uncertainty and risk; Complete and Incomplete Information: Expected value of information; Decision-making in Multi-Criteria Environment; Multi-Objective Optimization Problems; Goal Programming. Decision Theory; Classification of Decision Problems; Decision Environments: Decision-making under uncertainty, Decision-making under risk; Utility Theory: Axioms of utility theory; Decision Trees: Use of decision trees under certainty, uncertainty and risk; Complete and Incomplete Information: Expected value of information; Decision-making in Multi-Criteria Environment; Multi-Objective Optimization Problems; Goal Programming.

ENM444 Supply Chain Modeling And Analysis 3+0 4.5
Fundamentals of Supply Chain Management; Supply Chain Operations: strategic, tactical, and operational; Network Design in The Supply Chain: vehicle routing, transportation, facility location, capacity planning; Planning and Managing Inventories in a Supply Chain: Cycle inventory, safety inventory, determining the optimal level; Supply Chain Analysis; Management of Uncertainty in Supply Chain; Measuring Supply Chain Performance, Supplier Relationship Management; Supply Chain Management Softwares.

ENM446 Enterprise Resource Planning 3+0 4.5
System Modelling; Data Flow; Database and Relations, Data and process modelling; Information Processing, Information processing phases, Information processing methods; Information System Applications: Enterprise resource planning, Enterprise resource planning modules: Material management, Production planning, Sales and distribution management, Warehouse management, Quality management, Customer relationship management, Service management, Human resource management, Financial modules; Application of Modules.

ENM448 (Eng) Project Planning and Management 3+0 6.0
Project Management and its Steps; Project Management Process: Scoping agreement, Requirement statements, Task list, Work breakdown structure, Milestones; Developing a Plan and Scheduling a Project: CPM-PERT; Scheduling Resources

and Costs; Reducing Project Duration; Leadership and Project Teams; Monitoring Project: Progress and Performance Measurement and Evaluation; Project Closure.

ENM450 (Eng) Introduction to Metaheuristic Optimization 3+0 6.0

Optimization Models: Structure, Models, Exact solution methods; Introduction to Metaheuristic Optimization Methods: Np-hard problems, Necessity of metaheuristic optimization, Fundamentals, Hill climbing algorithm; Single-Solution Based Metaheuristics: Tabu search algorithm, Simulated annealing algorithm; Implementation of algorithms and industrial engineering applications; Evolutionary Algorithms: Fundamentals, Genetic algorithms, Ant colony algorithms, Bee colony algorithms, Implementation of algorithms and industrial engineering applications.

ENM452 (Eng) Introduction to Multiobjective Optimization 3+0 5.0

Basic Concepts: Decision variables space, Objectives space, Order relations in vector space and examples, Pareto optimality; Weighted Sum Method; ϵ -Constrained Method; Benson Method; Chebyshev Scalarization Method; Pascoletti-Serafini Scalarization Method; Conic Scalarization Method; Goal Programming; Application of Scalarization Methods to an Industrial Engineering Problem.

ENM454 Risk Assessment and Hazard Analysis Techniques 3+0 4.5

Fundamental Concepts of Risk Assessment; Risk Management; System Safety Concept; Causes of Accident Occurrence; Risk Assessment in Legislation; ISO 45001; Hazard Analysis Techniques: Methods using checklist and similar forms, Methods using matrix and form, Methods using flow diagrams, Other assessment methods; Risk Assessment and Hazard Analysis Techniques Practices; Precautions; Reporting of Occupational Accident and Risk Assessment.

ESTÜ101 Introduction to University Life 0+1 2.0

Orientation: Concept of university and understanding of university, General information about Eskisehir, Education and student discipline regulations, Ethics at the university, National and international exchange programs, General services of university, Faculty/department orientations; Self-improvement seminars: Research projects, Entrepreneurship, Respect to diversity, Social gender, Leisure philosophy, Zero waste and sustainability, Career planning and mind mapping, Scientific thinking and observation, Barrier - free living, Carbon footprint, Start-up practices, Project based internship.

ESTÜ102 Negotiation Techniques Class 2+0 3.0

(Eng)

Basic Concepts: Communication, Communication Process, Individual Communication, Corporate Communication, Communication Conflicts, Communication Tools, Communication Problems, Negotiation Process, Definition of Negotiation, Stages of Negotiation, Negotiation Process, Negotiation Problems; Conflict Management: Communication and Conflict, Types of Conflict, Conflict Management; Crisis Management: Crisis in Communication, Crisis Assessment, Types of Crisis, Crisis Management Plan, Examples of Successful Crisis Management; Negotiation, Social Media and Communication, Negotiation and Social Media, Communication Techniques in Social Media; Effective Communication and Negotiation

ESTÜ103 Ceramic Design Processes 2+1 3.0

Ceramic Design: Definition, Uses, Functions; Principles of Ceramic Design: Line, Color, Texture, Form, Scale, Direction; Analyzing of Design Methods Related to Ceramic; Prepare a Draft Study on the Subject; Prepare a Project With Designs; Determination and Preparation of Ceramic Sludge Types Used in Forming; Defined Production Methods and Knowledge Series Production Methods; Drying; Bisque Firing; Glazing and Glazed Firing.

ESTÜ104 Academic and Life Skills 2+1 3.0

Self-Awareness: Development of self, Early adulthood and self-concept; Values and Goals: Goal setting, Concrete goals and priorities. Considering resources; Effective time Management: Management and planning Definition of Stress; Psychological and Physiological Aspects of Stress; Emotions, Cognitive processes; Coping with Stress. Definition of Stress; Psychological and Physiological Aspects of Stress; Emotions, Cognitive processes; Coping with Stress.

ESTÜ104 (Eng) Academic and Life Skills 2+1 3.0

Self-Awareness: Development of self, Early adulthood and self-concept; Values and Goals: Goal setting, Concrete goals and priorities. Considering resources; Effective time Management: Management and planning Definition of Stress; Psychological and Physiological Aspects of Stress; Emotions, Cognitive processes; Coping with Stress. Definition of Stress; Psychological and Physiological Aspects of Stress; Emotions, Cognitive processes; Coping with Stress.

ESTÜ105 Big Data Analysis with SQL 2+2 4.5

ESTÜ106 Proje Yönetimi 2+1 3.0

Project Management Fundamentals: Definition of project; Human Resources and Communication Management; Quality Management in Projects; Procurement Planning in Projects; Stakeholders Management; Gantt Chart; Causality Relationship Between Activities; SWOT Analysis; Planning of Risk Management in Projects; Project Compression Analysis and Cost Management; Project Resources and Resource Scheduling; Project Monitoring with Earned Value Management; Control and Progress in Line with the Objective of the Projects; R&D Sample Projects; Project Practices.

ESTÜ111 Volunteering Works 1+2 4.0

Management and Organization Concepts; The Concept of Volunteering and Volunteer Management; Fundamental Volunteering Areas (Disaster and Emergency, Environment, Education and Culture, Sports, Health and Social Services etc.); Project Development Related to Volunteer Work and Participation in Volunteer Work in the Field; Ethics, Moral, Religious, Traditional Values and Principles in Volunteer Work; Participation in Voluntary Work in Public Institutions, Local Governments and Non Government Organizations (NGOs); Risk Groups in Society and Volunteering; Immigrants and Volunteering.

ESTÜ112 Cyber Security for Everyone 2+0 2.0

Basic Concepts: Computer components and definitions; Software: System software, Application software; Computer Networks: Concept of Network and Internet; Malware and Network Attacks: Viruses, Attacks; Computer and Access Security: Password selection, File sharing, Backup; Internet security: SSL, Fake websites; Security on Social Platforms: Fake news and people; Security Analysis: System analysis, Network traffic analysis; System and Network Security: Network security, System security, Mobile device security; Information Security Management System: ISO 27001; Personal Data Protection Law: PDL procedures; Information Technology Law: Information crimes and punishments.

ESTÜ113 Design Thinking 3+0 3.0

Design Thinking Concepts: Design thinking, Human-centered design, User research, Problem identification, Problem definition, Empathy, Idea development, Creativity, Idea elimination and selection, Low-precision prototyping, High-precision prototyping, User tests, Usage tests, Usability, Revision and iteration, Visual thinking, User-centered design, Design processes and innovation, applications, Presentation techniques.

ESTÜ114 Visual Thinking 3+0 3.0

Visual Thinking Concepts: Concepts of abstract and concrete, Point, Line, Surface, Volume, Composition, Repetition, Rhythm, Hierarchy, Harmony, Contrast, Measuring and scale; Presentation Techniques: Sketch, Color, Tone, Order; Visual Perception and Gestalt Theory: Figure-ground relationship, Proximity principle, Similarity principle, Completion principle, Continuity principle, Simplicity principle, Depth perception, Psychological effect; Visual Communication: Image reading, Image interpretation, Pictogram, Ideogram, Logotype.

ESTÜ115 Photographic Viewpoint 2+1 3.0

Course Introduction: Project work; Research and Discussion of the Project Subject: Evaluation of research results, Successful examples from photography and graphic art, Examination of examples of selected works, Determination of application subjects, Discussion of application possibilities, Basic design elements and principles in photography and graphic design process, Trial shooting and evaluation; Light and Lighting: Color and functions of color; Photography Techniques: Visual editing, Reading photographs; Methods and Techniques in Applied Photography: Technical evaluation of photographs and development stages of the photographs; Basic Rules of Composition in Photography: Perspective, Balance, Proportion, Texture, Shape, Perspective, Lens selection and application; Shooting Process and Graphic Interventions on Photographs; Photographic View Methods: Evaluation of shooting results; Preparation of Portfolio: Portfolio evaluation, Presentation methods and techniques, Exhibition preparation methods.

ESTÜ116 Computer Aided Design I 3+0 3.0

Concepts of Computer Aided Design: Introducing to fusion360, Introducing interface, Surface modeling, Solid modeling; Basic Commands: Sketching, Editing, Constraints, Timeline, Parameter modification, Technical drawing; Construction Commands: Create, Inspect, Insert; Surface Modeling Tools: Creating and editing surfaces; Assembly: Adjusting, Arranging, Joint, Additional options; Freeform Modeling: T-Splines, Surface creation, Surface editing, Symmetry and tools; Visualization: Assigning material, Scene settings, Rendering methods; Various Applications.

ESTÜ117 Computer Aided Design II 3+0 3.0

Concepts of Computer Aided Design: Surface and solid modeling, Differences between surface and solid modeling, Surface creation, Arrangement; Sheet Metal Processing: Sheet metal processing creation and editing; Advanced Modeling Tools: Product part modeling; Introduction to Simulation: FEA simulation, Analyzing and interpreting simulation results; Generative Design: Generative design concept, Generative design tools, Simulating and evaluating generative design results; Manufacturing Tools: 3D printing, Introduction to CAM, Introduction to electronics.

ESTÜ118 Visual Thinking with Concepts 3+0 3.0

Visual Thinking with Concepts: Perception as ability to know, Change of senses; Seeing and time, Seeing depth, Understanding shapes; Visual Perception: Abstraction; Static and dynamic concepts of abstraction, Context, Comparison of perception, Similarities; Image and thought: Mental images; Particular and spiritual images, Abstraction of the image, Perceived quantities, Geometry and meaning; Writing and speech: Words as images, Intuition and cognition, Perception of words, Verbal concepts and pictorial concepts; Vision in Education: Images and art, Looking and understanding, Visual education tools.

ESTÜ119 Flute 3+1 3.0

Breath Work: Breathing exercises the diaphragm and correctly use various activation studies; Technical Studies: Stance, Grip, Position, Fingering and embouchure work; Learning the Notes on the Flute: Learning the notes on the flute with octaves, The octave positions of the lip according to the study, A long blowing sound with learned notes; Technical Development; Proper Studies to be Determined by Instructor According to Student's Performance on the Scales: With learned notes, Sharp, Flat, Major and Minor, According to the ranking exercises scales; Flute Repertoire in the Context of Period, Style and interpretation: Selected works according to student performance from periods in music history.

ESTÜ120 Solfege 3+1 3.0

Octave of the Tone to be Specified According to The Groups; The Signs Used in Writing Music; Signs Spelling Rules; Staff and Additional Lines; Arrays and Intervals; Major and Minor Scales, Interests, and Varieties: Natural, Harmonic, Melodic; Measure and Time; The Terms of the Transaction; Marks of Dynamics; The Expression of Terms; According to Student Level and Profile to be Created Reading Pieces by the Teacher; Reading with Piano Accompaniment; Rhythmic Perception and Rhythmic Reading, and Only Two Voice Dictation Skills; to be Able to Read on Different Keys, to be Able to Read Complex Rhythmic Pieces with Piano Accompaniment Two, Three, Four-Voices Dictation Skills; Ability to Read Ceremonial Solfege, Atonal Solfege.

ESTÜ121 Piano 3+1 3.0

Starting Position on the Piano: By taking into consideration to correct position of hands, Arms, Fingers, And feet; Technical Development Exercises: Etudes, Scales, Chords and arpeggios studies; Techniques of Touching Piano Keyboard, Staccato, Legato, Non Legato; Information About Dynamics; Working with Learning Notes and Octaves: One hand and double hand into small pieces-small parts; Style and in the Context of Your Comment Piano Repertoire: Baroque, Classical, Romantic, And modern Turkish composers will be given according to the performance of student works.

ESTÜ122 Guitar 3+1 3.0

Theoretical studies: Writings symbols used in music; Basic information About Solfege; The Structural Characteristics of the Guitar; Guitar History; Introduction to Guitar: Learning the notes on guitar; Learning the Names of the Right Hand and The Left Hand; Technical Exercises on the Guitar; Scales; Arpeggios; Slurs; Barres; Repertoire: Proper studies to be determined by instructor according to student's performance on the scales; To Recognition of the Different Disciplines During The Phase of Prima Vista; To Make Conscious About Playing Together; Improving to Stage Performance.

ESTÜ123 Gender Equality in Work Life 2+0 3.0

ESTÜ125 Philosophy of Science 3+0 3.0

ESTÜ127 Diction 1+2 3.0

ESTÜ201 Turkish Sign Language 3+0 3.0

ESTÜ203 Introduction to Sociology 3+0 3.0

ESTÜ301 Science Communication 2+0 3.0

ESTÜ401 Introduction to Professional Life 1+1 2.0

Information about PL, What is needed for PL?, Sector Meetings, 21. Century Competencies: Improving self-awareness, Basic communication skills, Problem solving, Decision making and leadership, Teamwork; Effective Interview Techniques and Interview Simulation; Career Planning; Resume Preparation Techniques, Networking: Social networks for professional life; Project Management; Job Search Strategies.

ESTÜ403 Basic Computer Utilization 3+0 4.0

ESTÜ405 Computer Programming 3+0 5.0

ETK208 (Eng) Engineering Ethics 1+0 2.0

General Moral Principles; Moral Philosophy; Engineering Ethics Principles; Honesty and Responsibility in Engineering; Engineering Ethics Case Studies: Analysis of examples of situations which engineers may encounter in their professional life.

FEL102 Introduction to Philosophy 2+0 2.5

Fundamentals of Philosophy; Scope of Philosophy; History of Philosophy; Theory of Science; Theory of Knowledge; Logic; Ontology; Philosophy of Nature; Philosophy of History; Philosophy of Art; Philosophy of Language; Philosophical Anthropology; Ethics; Philosophy of Religion; Metaphysics; Schools of Philosophy; Development of Philosophical Perspective. Fundamentals of Philosophy; Scope of Philosophy; History of Philosophy; Theory of Science; Theory of Knowledge; Logic; Ontology; Philosophy of Nature; Philosophy of History; Philosophy of Art; Philosophy of Language; Philosophical Anthropology; Ethics; Philosophy of Religion; Metaphysics; Schools of Philosophy; Development of Philosophical Perspective.

FEL401 Philosophy of Science 2+0 2.5

Importance and Definition of Science: Science, Common Sense, Religion and philosophy, Formal disciplines, Science and Language, Scientific Method: Its content and boundaries, Various interpretations; Ways arriving at the phenomenon: Observation and experimentation, Logical structure of measurement; Scientific Explanation: Notion scientific law, Verification of hypothesis, Causal principle in science, Structure and Functions of Scientific Theory; Human-problems of Science: Responsibility of Scientist, Science and Humanism. Importance and Definition of Science: Science, Common Sense, Religion and philosophy, Formal disciplines, Science and Language; Scientific Method: Its content and boundaries, Various interpretations; Scientific Approach: Observation and experimentation, Logical structure of measurement, Scientific Explanation, Scientific law, Verification of hypothesis, Causal principle in science, Structure and Functions of Scientific Theory, Human-problems of Science; Responsibility of Scientist, Science and Humanism.

FİN415 (Eng) Financial Markets and Institutions 3+0 4.5

Financial System; Interest Rates; Efficiency in Financial Markets; Functions of Financial Institutions; Financial Crises; Central Banks; Monetary Policy: Goals, Tools; Money Markets; Bond Market: Properties of Bonds, Bond Valuation ; Stock Market: Properties of Stocks, Stock Valuation; Banking Industry: Structure and Competition of the Industry, Management of Banks ; Insurance Companies; Investment Banks; International Financial System.

FİZ105 Physics I 4+0 6.0

Measurement and Units: Measurement, Units, Dimensional analysis; Vectors: Vector and scalar quantities, Coordinate systems and frames of reference; Kinematics: Motion in one dimension, Motion in two dimensions; Dynamics; Work and Energy; Momentum and Collisions; Rotational Motion: Angular velocity and angular acceleration, Moments of inertia, Work and energy in rotational motion; Static Equilibrium.

FİZ105 (Eng) Physics I 4+0 6.0

Measurement and Units: Measurement, Units, Dimensional analysis; Vectors: Vector and scalar quantities, Coordinate systems and frames of reference; Kinematics: Motion in one dimension, Motion in two dimensions; Dynamics; Work and Energy; Momentum and Collisions; Rotational Motion: Angular velocity and angular acceleration, Moments of inertia, Work and energy in rotational motion; Static Equilibrium.

FİZ106 Physics II 4+0 6.0

Electric Fields: Electric charge, Coulomb's law, Electric flux, Gauss's law; Electric Potential: Potential difference, Potential energy, Obtaining the electric field from the electric potential; Capacitors: Definition and calculation of a capacitance, Capacitors with dielectrics, Energy stored in a charged capacitor, Electric dipole in an external electric field; Electric Current; Magnetic Field: Sources of the magnetic field, Electromagnetic induction.

FİZ106 (Eng) Physics II 4+0 6.0

Electric Fields: Electric charge, Coulomb's law, Electric flux, Gauss's law; Electric Potential: Potential difference, Potential energy, Obtaining the electric field from the electric potential; Capacitors: Definition and calculation of a capacitance, Capacitors with dielectrics, Energy stored in a charged capacitor, Electric dipole in an external electric field; Electric Current; Magnetic Field: Sources of the magnetic field, Electromagnetic induction.

FiZ107 Physics Laboratory I 0+2 1.5

SI Unit System and Dimension Analysis; Measurement and Error Calculations; Graph Analysis; Principles of Experimental Studying and Preparation of Experimental Reports; Variation of Range due to Shooting Angle; Conservation of Energy; Motion with Constant Acceleration; Measurement of Angular Velocity; Determination of Moment of Inertia; Freely Falling; Simple Pendulum; Motion on Inclined Plane; Mass-spring System; Viscosity.

FiZ107 (Eng) Physics Laboratory I 0+2 1.5

SI Unit System and Dimension Analysis; Measurement and Error Calculations; Graph Analysis; Principles of Experimental Studying and Preparation of Experimental Reports; Variation of Range due to Shooting Angle; Conservation of Energy; Motion with Constant Acceleration; Measurement of Angular Velocity; Determination of Moment of Inertia; Freely Falling; Simple Pendulum; Motion on Inclined Plane; Mass-spring System; Viscosity.

FiZ108 Physics Laboratory II 0+2 1.5

Usage of Electrical Measuring Instruments; Security Rules in Electrical Experiments; Principles of Experimental Studying and Preparation of Experimental Reports; Parallel-Plate Capacitor; Investigation of Charge Distribution on Surface of any Conductor; Ohm's Law through DC Electric Circuits; Wheatstone Bridge; Electromagnetic Induction; Transformer; Determination of Emf and Inner Resistance; Determination of Frequency; Oscilloscope.

FiZ108 (Eng) Physics Laboratory II 0+2 1.5

Usage of Electrical Measuring Instruments; Security Rules in Electrical Experiments; Principles of Experimental Studying and Preparation of Experimental Reports; Parallel-Plate Capacitor; Investigation of Charge Distribution on Surface of any Conductor; Ohm's Law through DC Electric Circuits; Wheatstone Bridge; Electromagnetic Induction; Transformer; Determination of Emf and Inner Resistance; Determination of Frequency; Oscilloscope.

FOT202 Photography 2+0 3.0

Introduction to Photography: Relations between architects and photography, Description of visual aspect of architecture, Use of photography in the presentation of architectural products; The camera; Process of photographing; Film Development Procedure for Black and White Films, Film Development Procedure for Colored Films and Slides; Printing Processes.

FRA255 (Fra) French I 3+0 4.0

Language Functions: Greetings, Invitations, accepting or refusing invitations; Vocabulary Knowledge: Nourishment, Accommodation, Clothing and colors, Bairams and activities; Grammar: Expressions showing quantity, Demonstrative and possessive adjectives, Prepositions and time indicators, Stressed personal pronouns, Imperatives, Verbs with double pronouns; Learning About French Culture: An area in France: La Bourgogne; Pronunciation, Semi-vowels, Gliding.

FRA256 (Fra) French II 3+0 4.0

Language functions: Imperatives and wishes; Evaluation, Proving and Thanking; Vocabulary: Nourishment, Accommodation, Clothing and colors, Bairams and activities; Ordinal Numbers; Grammar: Expressions showing quantity, Demonstrative and Possessive Adjectives, Prepositions and Time indicators, Stressed personal pronouns: Imperative moods, Verbs with double pronouns; Learning about Target Culture: An Area in France: La Bourgogne; Pronunciation: Intonation, Semi-Vowels, Gliding.

HUK252 Labor Law 2+0 2.5

History of Labor Law; Sources and Basic Principles of Labor Code: Employee, Employer, Representative to the employer; Work place; Contract of Service: Types and termination, Consequences of termination, Severance pay; Regulation of Work with regard to Workers; Groups to be Protected (Women, Children, Handicapped and Sentenced Workers); Health and Security at the Work Place; Working Time; Overtime Work; Night Work; Preparing, Completing and Cleaning at Work. History of Labor Law; Sources and Basic Principles of Labor Code: Employee, Employer, Representative to the employer; Work place; Contract of Service: Types and termination, Consequences of termination, Severance pay; Regulation of Work with regard to Workers; Groups to be Protected (Women, Children, Handicapped and Sentenced Workers); Health and Security at the Work Place; Working Time; Overtime Work; Night Work; Preparing, Completing and Cleaning at Work.

HUK458 Industrial Rights and Technological Development 3+0 3.0

Overall look at the intellectual systems; General principles of industrial rights; The categories of industrial rights; Patent, trademark; industrial design; Topographies of integrated circuits; Protection of microorganisms; Discussion on the "invention" concept; Background motivation of inventions; Use of inventions in daily life; The rights of the inventors;

Special work on the patent system; The use of patent system in production by the engineers; Use of patent archives; Search for invention whether it is patentable or not; Preparing a patent file.

iKT151 Economics 3+0 3.0

Basic Economic Concepts; Production Process; Optimal Consumer Behavior; Demand; Supply; Equilibrium Price; Market Types; Determination of Factor Prices; National Product; Nominal and Real National Income; Introduction to Monetary Theory; Factors Determining Fluctuation and National Income: Consumption expenditures, Investment expenditures, Employment; International Economic Relations: International mobility of goods and services, International mobility of factors of production; Economic Growth and Development. Basic Economic Concepts; Production Process; Optimal Consumer Behavior; Demand; Supply; Equilibrium Price; Market Types; Determination of Factor Prices; National Product; Nominal and Real National Income; Introduction to Monetary Theory; Factors Determining Fluctuation and National Income: Consumption expenditures, Investment expenditures, Employment; International Economic Relations: International mobility of goods and services, International mobility of factors of production; Economic Growth and Development.

iKT151 (Eng) Economics 3+0 3.0

Basic Economic Concepts; Production Process; Optimal Consumer Behavior; Demand; Supply; Equilibrium Price; Market Types; Determination of Factor Prices; National Product; Nominal and Real National Income; Introduction to Monetary Theory; Factors Determining Fluctuation and National Income: Consumption expenditures, Investment expenditures, Employment; International Economic Relations: International mobility of goods and services, International mobility of factors of production; Economic Growth and Development. Basic Economic Concepts; Production Process; Optimal Consumer Behavior; Demand; Supply; Equilibrium Price; Market Types; Determination of Factor Prices; National Product; Nominal and Real National Income; Introduction to Monetary Theory; Factors Determining Fluctuation and National Income: Consumption expenditures, Investment expenditures, Employment; International Economic Relations: International mobility of goods and services, International mobility of factors of production; Economic Growth and Development.

iKT209 (Eng) Money and Banking 3+0 5.0

Basic Concepts of Financial System; Difficulty in Defining Money; Asset- Demand Theory and Determination of Equilibrium Interest Rates; Risk, Term and Tax Structure of Interest Rates; Bank as a Firm: Asset and liability management in banking, Exchange rate risk and interest rate risk and risk management, Balance sheet of a bank and Creation of deposit; Role of House holds; Banks and Central Bank in Mechanism of Money Stock Determination; Tools of Monetary Policy; Money Demand Theories and the Equilibrium in Money Market. Basic Concepts of Financial System; Difficulty in Defining Money; Asset- Demand Theory and Determination of Equilibrium Interest Rates; Risk, Term and Tax Structure of Interest Rates; Bank as a Firm: Asset and liability management in banking, Exchange rate risk and interest rate risk and risk management, Balance sheet of a bank and Creation of deposit; Role of House holds; Banks and Central Bank in Mechanism of Money Stock Determination; Tools of Monetary Policy; Money Demand Theories and the Equilibrium in Money Market.

iKT356 (Eng) Engineering Economics 3+0 4.5

Principles of Engineering Economics; Time Value of Money; Investment Problems; Capital Formation by Installments; Capital Formation; Consumer Loans; Payments with Equal Installments; Basic Evaluation Techniques: Present Worth Method; Internal Rate of Return Method; Comparison of Alternative Investment Decisions; Breakeven Analysis; Replenishment Investments.

iKT427 Industrial Economics 2+0 3.0

Industrial Market Structure and Economic Performance; Determinants of Market Structure; Determinants of Behavior and Performance; Acts of Firms in Different Industrial Structures; Overt and Covert Agreements; Entry to and Exiting from a Market; Pricing Strategies and the Market Power; Game theory.

iLT201 Interpersonal Communication 3+0 4.5

Verbal Communication; Speaking Skills As Dimension of Interpersonal Communication; Listening Capabilities As Dimension of Interpersonal Communication; Non-Verbal Communication; Signs And Meanings; Stress And Stress Management; Group; Group Dynamics; Small Group Characteristics; Persuasion; Speaking And Listening; Time And Time Management; Interpersonal Communication; History of Communication Research. Verbal Communication; Speaking Skills As Dimension of Interpersonal Communication; Non-Verbal Communication; Signs And Meanings; Stress And Stress Management; Group; Group Dynamics; Small Group Characteristics; Persuasion; Speaking And Listening; Time And Time Management; Interpersonal Communication; History of Communication Research.

iLT201 (Eng) Interpersonal Communication 3+0 4.5

Verbal Communication; Speaking Skills As Dimension of Interpersonal Communication; Listening Capabilities As Dimension of Interpersonal Communication; Non-Verbal Communication; Signs And Meanings; Stress And Stress Management; Group; Group Dynamics; Small Group Characteristics; Persuasion; Speaking And Listening; Time And Time

Management; Interpersonal Communication; History of Communication Research. Verbal Communication; Speaking Skills As Dimension of Interpersonal Communication; Listening Capabilities As Dimension of Interpersonal Communication; Non-Verbal Communication; Signs And Meanings; Stress And Stress Management; Group; Group Dynamics; Small Group Characteristics; Persuasion; Speaking And Listening; Time And Time Management; Interpersonal Communication; History of Communication Research.

iLT328 (Eng) Communication Skills 1+0 1.0

Introduction to Communication Skills, Communication in Organisations Models of the Communication Process, Verbal, Non-verbal and Visual Communication, Interpersonal Communication Competence, Business Communication Skills, Elements of Efficient Presentational Communication, Preparation and Implementation of Presentations, Sales Communication, Negotiations and Persuasion, Cooperation, Conducting Business Meetings, Interviewing, Communication through Writing, Business Communications through Electronic Media.

iLT370 New Approaches in Management 3+0 6.5

Paradigm Changes in Management; System Approach; Organization Culture; Reconstruction; Total Quality Management; Team Work and Organization; Learning Organization; E-Business.

iLT419 Body Language and Diction 2+0 5.0

Research on Body Language and Concepts of Body Language; Face-to-Face Relations; Relation between Human and Society; Relation between Body and Objects; Relation between Body and Space; Orientation Exercises; Diction Exercises: Intonation, Stress, Articulation; Use of Voice: Control of sound volume, tone color and breath; Speech Control; Movements of Head and Eyes; Facial Expressions; Use of Hands and Arms; Use of Feet and Legs; Harmony in Body Use; Relation between Speech and Body Use; Harmonious Use of Body, Space and Objects.

iNG250 (Eng) Reading and Speaking in English 2+0 2.0

Combining reading and speaking skills; Reading and Discussing Contemporary texts; Reading Strategies: Skimming, Scanning, Guessing Meaning from the Context; Speaking Activities Based on the Readings

iNG360 (Eng) English for Business 2+0 2.0

Developing Business English Skills for Variety of Situations: Speaking to people in business situations; Practice in planning and writing letters, Telexes and memos; Practice in Making Different Kinds of Calls; Writing and Summarizing Reports; Ordering and Supplying Goods or Services; Going on Business Trips and Guiding Foreign Visitors; How to do Market Research and Promotion; Participating in Group Meetings; Informal One-to-one Meetings and Committee meetings.

iN\$101 Introduction to Civil Engineering 2+0 3.5

History of Civil Engineering; Introduction to Main Divisions of Civil Engineering Department; Engineering Materials; General Properties of Mechanical Behaviour; Theoretical and Experimental Studies; Taking and Analysing of Experimental Data; Selected Examples from the Design and Construction Site; Written and Oral Communication in Civil Engineering; Engineering Judgement; Evaluation with Department. History of Civil Engineering; Introduction to Subfields of Civil Engineering; Engineering Materials; General Properties of Mechanical Behaviour; Theoretical and Experimental Studies; Gathering and Analysis of Data; Samples of from Design and Construction Sites; Written and Oral Communication in Civil Engineering; Development of Engineering Judgement.

iN\$101 (Eng) Introduction to Civil Engineering 2+0 3.5

History of Civil Engineering; Introduction to Main Divisions of Civil Engineering Department; Engineering Materials; General Properties of Mechanical Behaviour; Theoretical and Experimental Studies; Taking and Analysing of Experimental Data; Selected Examples from the Design and Construction Site; Written and Oral Communication in Civil Engineering; Engineering Judgement; Evaluation with Department. History of Civil Engineering; Introduction to Subfields of Civil Engineering; Engineering Materials; General Properties of Mechanical Behaviour; Theoretical and Experimental Studies; Gathering and Analysis of Data; Samples of from Design and Construction Sites; Written and Oral Communication in Civil Engineering; Development of Engineering Judgement.

iN\$118 Computer Applications in Civil Engineering 2+2 4.5

Word Processor Program: General description, Page and paragraph layout, Adding symbols and equations, Adding figures and tables, Adding footer and header, Using the references tab, Writing a technical report; Spreadsheet Program: General description, Data input, Adding formulas and functions, Drawing graphs, Matrix operations, Data filtering, Conditional formatting, Applications for civil engineers, Macro and algorithm; Presentation Design Program: General description, Creating and editing slides, Preparing effective presentations; Introduction to 3D Drawing Program: Drawing basic geometric shapes, Using layers, Dimensioning; Technical Softwares for Civil Engineers.

iN\$239 Law and Ethics in Civil Engineering 3+0 3.0

A Brief History of Ethics; Introduction to Ethical Conflicts; Values and Value Systems/History of Engineering Profession; Engineering and Ethics; Environmental Ethics; Ethics, Liability and Legal Issues for Civil Engineers; Case Studies for Engineering Ethics; 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. A Brief History of Ethics; Introduction to Ethical Conflicts; Values and Value Systems/History of Engineering Profession; Engineering and Ethics; Environmental Ethics; Ethics, Liability and Legal Issues for Civil Engineers; Case Studies for Engineering Ethics; 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.

iN\$239 (Eng) Law and Ethics in Civil Engineering 3+0 3.0

A Brief History of Ethics; Introduction to Ethical Conflicts; Values and Value Systems/History of Engineering Profession; Engineering and Ethics; Environmental Ethics; Ethics, Liability and Legal Issues for Civil Engineers; Case Studies for Engineering Ethics; 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. A Brief History of Ethics; Introduction to Ethical Conflicts; Values and Value Systems/History of Engineering Profession; Engineering and Ethics; Environmental Ethics; Ethics, Liability and Legal Issues for Civil Engineers; Case Studies for Engineering Ethics; 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.

iN\$240 (Eng) Hydrology 3+0 4.5

Introduction: Hydrology in water resources engineering, The Hydrologic Cycle; Precipitation: Formation of precipitation, Analysis of precipitation data, Rational method, Statistical methods, Streamflow: Water stage measurement, Discharge computation, Interpretation of streamflow data; Evaporation and Transpiration: Factors affecting evaporation, Measurement of evaporation, Estimation of evaporation, Basin: Shape of the basin, Drainage characteristics of the basin, Time of concentration, Infiltration; Hydrograph Analysis: Components of runoff, Hydrograph, Hydrograph components; Flood Routing: Storage equation, Reservoir routing; Statistical Methods in Hydrology.

iN\$241 (Eng) Materials Science in Civil Engineering 3+0 5.0

Atomic Structure; Arrangement of the Atoms; Structural Defects: Point defects, Dislocations, Planar defects; Mechanical Tests and Properties: Tension, Compression, Impact test, Hardness, Fatigue; Deformation of the Materials; Metallography: Preparation of the samples, Observation with optic and electron microscope; Treatment Increasing the Strength of the Materials; Solidifying and Cooling Curves, Phase diagrams; Iron Alloys: Steels, Cast irons, Heat treatments; Metals and Alloys Excluding Iron: Aluminum, Titanium, Copper alloys, Composite Materials.

iN\$246 (Eng) Computer Programming in Civil Engineering 1+2 3.5

Introduction To Programming; Fundamentals of Algorithms; Pseudocode and Flowcharts; Flowchart for design and algorithms; Basic Elements of Programming; String and Input; Control and Loop Structures; File Management; Sub Functions; Programming With A Spreadsheet Program; Graphic and Tabular Presentations; Algorithm Design and Numerical Solutions of Civil Engineering Problems.

iN\$302 Reinforced Concrete I 3+2 6.0

Concrete and Steel Materials; Basic Behavior of Reinforced Concrete; Principles of Calculation; Elastic Theory and Ultimate Strength Theory; Structural Safety; Axially Loaded Members; Ultimate Strength of Members Subject to Flexure; Combined Flexure and Axial Load Columns; Shear-Diagonal Tension; Torsion; Shear and Flexure; Bond and Anchorage.

iN\$302 (Eng) Reinforced Concrete I 3+2 6.0

Concrete and Steel Materials; Basic Behavior of Reinforced Concrete; Principles of Calculation; Elastic Theory and Ultimate Strength Theory; Structural Safety; Axially Loaded Members; Ultimate Strength of Members Subject to Flexure; Combined Flexure and Axial Load Columns; Shear-Diagonal Tension; Torsion; Shear and Flexure; Bond and Anchorage.

iN\$307 (Eng) Structural Analysis I 3+2 6.0

Fundamentals of Structural Analysis; Assumptions in Structural Analysis; Loads and Supports; Classification of Structure Systems; Internal Forces in Structure Members; Determining Degree of Indeterminacy in Structural Systems; Determining Internal Forces in Statically Determinacy Systems: Simple beams, Cantilever beams, Hinged girders, Frames, Arches and frames of three hinges; Solving Live Loads Systems Using Influence Lines; Determining Internal Forces in Statically Indeterminacy Systems.

iN\$308 (Eng) Hydrology 3+0 4.5

Hydrologic cycle: Water resources in the world, Introduction to hydrology; Precipitation: Occurrence of precipitation and its measurement; Evapotranspiration; Factors influencing Evapotranspiration and Their Measurement; Infiltration:

Computation of infiltration capacity, Infiltration index; Groundwater; Surface flow: Hydrologic region and surface flow, Measurement of level and velocity; Hydrographs: Characteristic Points of Flow Hydrograph; Analysis and Synthesis of Hydrograph; Statistical Analysis of Hydrologic Data.

iN\$310 Water Supply and Sewerage 3+2 4.5

Hydrology; Collection of Surface Water: Water Supply from Rivers, Lakes and Dams; Collection of Groundwater Supply: From Hillside and Wells; Water Transmission by Pipe Lines: Hydraulics; Operations and Distribution Systems: Waste Water Collection; Sewers; Flow in Sewers and Sewer Appurtenances; Design of Sewer System; Waste Water Treatment Methods.

iN\$310 (Eng) Water Supply and Sewerage 3+2 4.5

Hydrology; Collection of Surface Water: Water Supply from Rivers, Lakes and Dams; Collection of Groundwater Supply: From Hillside and Wells; Water Transmission by Pipe Lines: Hydraulics; Operations and Distribution Systems: Waste Water Collection; Sewers; Flow in Sewers and Sewer Appurtenances; Design of Sewer System; Waste Water Treatment Methods.

iN\$311 Transportation Engineering I 3+2 6.0

Transportation Types And Their Comparison; Description of Basis Members of Highway; Characteristics of Drivers, Pedestrians And Vehicles; Sight Distances; Highway Location Study; Reconnaissance Survey; Survey; Setting-Out; Relocation; Horizontal Curves; Vertical Curves; Profile Study; Pavement And Pavement Design; Traffic Engineering Applications; Traffic Flow And Density; Transportation Planning; Trip Generation And Distribution; Modal Split And Traffic Assignment.

iN\$311 (Eng) Transportation Engineering I 3+2 6.0

Transportation Types And Their Comparison; Description of Basis Members of Highway; Characteristics of Drivers, Pedestrians And Vehicles; Sight Distances; Highway Location Study; Reconnaissance Survey; Survey; Setting-Out; Relocation; Horizontal Curves; Vertical Curves; Profile Study; Pavement And Pavement Design; Traffic Engineering Applications; Traffic Flow And Density; Transportation Planning; Trip Generation And Distribution; Modal Split And Traffic Assignment.

iN\$312 (Eng) Construction Engineering and Management 3+0 4.5

Structure of Construction Firms; Management Functions; Management Techniques of Small -size And Family Owned Construction Companies; Process of Construction Contract And Documentation; Relationship Between Employee and Employer; Construction Safety; Project Management; Organization and Planning; Labour Law; Strike and Lock-out: Reasons; Precautions and Results of the Construction Defects; Application of Construction Cost Analysis and Estimating; Construction Bidding Principles; Site Management and Organization; Construction Projects Insurance; Change Orders and Construction Equipment Management. Structure of Construction Firms; Management Functions; Management Techniques of Small and Family Owned Construction Companies; Process of Construction Contract and Documentation; Relationship Between Employee and Employer; Construction Safety; Project Management; Organization and Planning; Labor Law; Strike and Lock-out: Reasons; Precautions and Results of the Construction Defects; Construction Cost Analysis and Estimation; Construction Bidding Principles; Site Management and Organization; Construction Projects Insurance; Change Orders and Construction Equipment Management.

iN\$314 (Eng) Structural Analysis II 3+0 4.5

Deflections of Beams and Frames, Double Integration Method; Moment-Area Method, Conjugate Beam Method; Work-Energy Methods, Virtual work method; Castigliano's Theorems, The Method of Least Work; Force Method of Analysis, and its application to beams and frames; Force Method of Analysis, application to trusses; Three Moments Equation; Slope Deflection Method, and its application to beams and frames without sidesway; Slope Deflection Method, application to beams and frames with sidesway; Symmetrical structures with symmetrical loadings; Symmetrical structures with skew-symmetrical loadings; Moment Distribution Method and its application to beams and frames without sidesway; Moment Distribution Method and its application to beams and frames with sidesway. Deflections of Beams and Frames, Double Integration Method; Moment-Area Method, Conjugate Beam Method; Work-Energy Methods, Virtual work method; Castigliano's Theorems, The Method of Least Work; Force Method of Analysis, and its application to beams and frames; Force Method of Analysis, application to trusses; Three Moments Equation; Slope Deflection Method, and its application to beams and frames without sidesway; Slope Deflection Method, application to beams and frames with sidesway; Symmetrical structures with symmetrical loadings; Symmetrical structures with skew-symmetrical loadings; Moment Distribution Method and its application to beams and frames without sidesway; Moment Distribution Method and its application to beams and frames with sidesway.

iN\$315 (Eng) Soil Mechanics I 3+0 4.5

Introduction to Soil Mechanics: Origin of soil; Physical and Index Properties of Soil: Soil structure, Grain size distribution, Weight-volume relationship, Consistency limits; Classification of Soils; Permeability; Seepage and Flow Nets; Soil Stresses: Total and effective stress in soil; Soil Compaction: Laboratory and field compaction methods; Stress Increases in

Soil Due to Surface Loading; Soil Settlements: Immediate settlement, Consolidation theory, Settlement calculations, Consolidation coefficient, Time rate of consolidation.

iN\$317 (Eng) Soil Mechanics Laboratory 0+2 1.5

Introduction: Experimental study, General laboratory safety rules; Relationship Between Theory and Experiments: Data analysis, Interpretation of results; Disturbed and Undisturbed Soil Sampling; Soil Index Tests: Sieve analysis and hydrometer, Water content, Specific gravity; Atterberg limits: Liquid limits, Plastic limits, Shrinkage limit; Soil Permeability Tests; Soil Compaction Tests: Standard proctor, Modified proctor, Sand cone and nuclear density meter; Oedometer Test; Soil Strength Tests: Unconfined compression test, Triaxial compression test, Shear box test; Introduction to Field Tests; Preparation of Soil Investigation Report.

iN\$320 Steel Structures 3+0 4.5

Introduction to Steel Structures; Steel for Structural Material; Steel Connection Tools: Bolt and bolted connections; Tension Members: Stress calculations, Connection of tension members; Compression Members; Effect of Combined Flexural and Axial Load on Constant Cross-Sectional Members; Truss Systems; Plate Girders: Profile beams, Welded beams, Beam joints, Supports and connections.

iN\$320 (Eng) Steel Structures 3+0 4.5

Introduction to Steel Structures; Steel for Structural Material; Steel Connection Tools: Bolt and bolted connections; Tension Members: Stress calculations, Connection of tension members; Compression Members; Effect of Combined Flexural and Axial Load on Constant Cross-Sectional Members; Truss Systems; Plate Girders: Profile beams, Welded beams, Beam joints, Supports and connections.

iN\$322 (Eng) Hydraulics 3+2 6.0

iN\$342 Foundation Engineering I 3+0 4.5

Soil Exploration Methods; Number of Bore Holes and Determination of their Place; Methods of Sampling; Various Institutional Experiments; Various Loading Types Concern in Foundation Design; Open Excavations; Supporting of Excavation Surfaces; Retaining Wall; Shallow Foundations; Single, Combined and Mat Foundations, Deep Foundation; Introduction to Pile Foundation. Soil Exploration Methods; Number of Bore Holes and Determination of their Place; Methods of Sampling; Various Institutional Experiments; Various Loading Types Concern in Foundation Design; Open Excavations; Supporting of Excavation Surfaces; Retaining Wall; Shallow Foundations; Single, Combined and Mat Foundations, Deep Foundation; Introduction to Pile Foundation.

iN\$342 (Eng) Foundation Engineering I 3+0 4.5

Soil Exploration Methods; Number of Bore Holes and Determination of their Place; Methods of Sampling; Various Institutional Experiments; Various Loading Types Concern in Foundation Design; Open Excavations; Supporting of Excavation Surfaces; Retaining Wall; Shallow Foundations; Single, Combined and Mat Foundations, Deep Foundation; Introduction to Pile Foundation. Soil Exploration Methods; Number of Bore Holes and Determination of their Place; Methods of Sampling; Various Institutional Experiments; Various Loading Types Concern in Foundation Design; Open Excavations; Supporting of Excavation Surfaces; Retaining Wall; Shallow Foundations; Single, Combined and Mat Foundations, Deep Foundation; Introduction to Pile Foundation.

iN\$401 Reinforced Concrete Project 3+0 4.5

Introduction; Determination of Architecture Project; Slab Load Analysis; Static and Reinforced Concrete Calculations of Slab; Beam Load Analysis; Determination of Frames; Static Analysis of Vertical Loads; Determination of Earthquake Loads; Static Analysis under Earthquake Loads; Analysis of Reinforced Concrete Beams, Columns and Foundations.

iN\$401 (Eng) Reinforced Concrete Project 3+0 4.5

Introduction; Determination of Architecture Project; Slab Load Analysis; Static and Reinforced Concrete Calculations of Slab; Beam Load Analysis; Determination of Frames; Static Analysis of Vertical Loads; Determination of Earthquake Loads; Static Analysis under Earthquake Loads; Analysis of Reinforced Concrete Beams, Columns and Foundations.

iN\$407 Reinforced Concrete II 3+0 4.5

Introduction and Definitions; Types of Slab: Plate slab, Serrated slab, Method of approximate calculations; Foundations: Wall foundations, Individual foundations, Continuous foundations, Combined foundations, Mat foundations; Retaining Walls; Selection of Types; Calculations and Projects; Simple and Continuous High Beams; Stairs; Storage: High storage, Underground storage, Circular and rectangular storage.

iN\$407 (Eng) Reinforced Concrete II 3+0 4.5

Introduction and Definitions; Types of Slab: Plate slab, Serrated slab, Method of approximate calculations; Foundations: Wall foundations, Individual foundations, Continuous foundations, Combined foundations, Mat foundations; Retaining Walls; Selection of Types; Calculations and Projects; Simple and Continuous High Beams; Stairs; Storage: High storage, Underground storage, Circular and rectangular storage.

iN\$409 Pavement Design 3+0 4.5

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; Subgrades; Bases And Subbases; Bituminous Surfaces; Design of Pavement Evaluation Performance Evaluation Surveys And The Design of Asphaltic 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.

iN\$409 (Eng) Pavement Design 3+0 4.5

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; Subgrades; Bases And Subbases; Bituminous Surfaces; Design of Pavement Evaluation Performance Evaluation Surveys And The Design of Asphaltic 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.

iN\$411 Transportation Engineering II 3+0 4.5

Introduction; Railway Cars and Features; Mechanics of Traction: Equation of movement and application; Identification of Location Standard Elements; Geometric Features and Analysis; Slopes, Curves; Location Analysis: Rails, Railway Sleeper, Ballast, Top Structure Implementation; Circulation of Stones on Location; Stations: Principle of stations and railroad lines.

iN\$411 (Eng) Transportation Engineering II 3+0 4.5

Introduction; Railway Cars and Features; Mechanics of Traction: Equation of movement and application; Identification of Location Standard Elements; Geometric Features and Analysis; Slopes, Curves; Location Analysis: Rails, Railway Sleeper, Ballast, Top Structure Implementation; Circulation of Stones on Location; Stations: Principle of stations and railroad lines.

iN\$414 Applications of Design in Civil Engineering 2+4 5.5

Structure, Geotechnics, Hydraulics, Hydrology, Construction Management, Transportation, Construction Materials, Soil Modelling, Slope Stability, Rock Mechanics, Soil Dynamics, Deep Excavations, Composite Materials, Materials Modelling, Advanced Concrete Technology, Calculations of Special Concrete Mixtures, Water Supply Structures, Stochastic Methods in Hydrology, Flood Controls, Dams, Steel Structures, Tall Buildings, Advanced Structural Analysis, Construction Cost Analysis, Project Management, Transportation Planning, Traffic Flow Theory, Rail Way Management. Structure, Geotechnics, Hydraulics, Hydrology, Construction Management, Transportation, Construction Materials, Soil Modelling, Slope Stability, Rock Mechanics, Soil Dynamics, Deep Excavations, Composite Materials, Materials Modelling, Advanced Concrete Technology, Calculations of Special Concrete Mixtures, Water Supply Structures, Stochastic Methods in Hydrology, Flood Controls, Dams, Steel Structures, Tall Buildings, Advanced Structural Analysis, Construction Cost Analysis, Project Management, Transportation Planning, Traffic Flow Theory, Rail Way Management.

iN\$414 (Eng) Applications of Design in Civil Engineering 2+4 5.5

Structure, Geotechnics, Hydraulics, Hydrology, Construction Management, Transportation, Construction Materials, Soil Modelling, Slope Stability, Rock Mechanics, Soil Dynamics, Deep Excavations, Composite Materials, Materials Modelling, Advanced Concrete Technology, Calculations of Special Concrete Mixtures, Water Supply Structures, Stochastic Methods in Hydrology, Flood Controls, Dams, Steel Structures, Tall Buildings, Advanced Structural Analysis, Construction Cost Analysis, Project Management, Transportation Planning, Traffic Flow Theory, Rail Way Management. Structure, Geotechnics, Hydraulics, Hydrology, Construction Management, Transportation, Construction Materials, Soil Modelling, Slope Stability, Rock Mechanics, Soil Dynamics, Deep Excavations, Composite Materials, Materials Modelling, Advanced Concrete Technology, Calculations of Special Concrete Mixtures, Water Supply Structures, Stochastic Methods in Hydrology, Flood Controls, Dams, Steel Structures, Tall Buildings, Advanced Structural Analysis, Construction Cost Analysis, Project Management, Transportation Planning, Traffic Flow Theory, Rail Way Management.

iN\$415 Special Topics in Civil Engineering 2+2 3.0

Literature Review: Structure, Geotechnics, Hydraulics, Construction management, Transportation, Construction materials, Mechanics; Civil Engineering Design Principles: Soil modelling, Foundations, Deep excavations, Advanced concrete technology, Calculations of special concrete mixtures, Water supply structures, Statistical methods in hydrology, Steel structures, Tall buildings, Advanced structural analysis, Construction cost analysis, Project management, Transportation planning, Traffic flow theory.

iNŞ415 (Eng) Special Topics in Civil Engineering 2+2 3.0

Literature Review: Structure, Geotechnics, Hydraulics, Construction management, Transportation, Construction materials, Mechanics; Civil Engineering Design Principles: Soil modelling, Foundations, Deep excavations, Advanced concrete technology, Calculations of special concrete mixtures, Water supply structures, Statistical methods in hydrology, Steel structures, Tall buildings, Advanced structural analysis, Construction cost analysis, Project management, Transportation planning, Traffic flow theory.

iNŞ417 Design Project 2+2 4.0

Definition of Complex Engineering Problems: Modern desing methods, Analysis and Modeling; Complex Systems: Boundary conditions and other constraints, Components, Subsystems, Processes; Experimental study: Experimental design, Data analysis, Interpretation of results; Design in Multi-Disciplinary Teams: Determination of stakeholders, Analysis and solution methods; Reporting, presentation and sharing with the society.

iNŞ417 (Eng) Design Project 2+2 4.0

Definition of Complex Engineering Problems: Modern desing methods, Analysis and Modeling; Complex Systems: Boundary conditions and other constraints, Components, Subsystems, Processes; Experimental study: Experimental design, Data analysis, Interpretation of results; Design in Multi-Disciplinary Teams: Determination of stakeholders, Analysis and solution methods; Reporting, presentation and sharing with the society.

iNŞ451 (Eng) Geographic Information Systems (GIS) Applications in Hydrology and Hydraulics 2+2 4.5

Introduction to Geographic Information Systems; Spatial Coordinate Systems, Digital elevation models: TIN and GRID concepts for hydrologic and hydraulic studies, River and watershed networks, Soil and land use mapping, Terrain analysis for hydrologic and hydraulic modeling, 3-dimensional analysis, Flood modeling and flood plain mapping. Introduction to Geographic Information Systems; Spatial Coordinate Systems, Digital elevation models: TIN and GRID concepts for hydrologic and hydraulic studies, River and watershed networks, Soil and land use mapping, Terrain analysis for hydrologic and hydraulic modeling, 3-dimensional analysis, Flood modeling and flood plain mapping.

iNŞ452 (Eng) Computer Applications in Hydrology and Hydraulics 2+2 4.5

Investigation of Widely Used Computer Software in Hydrology and Hydraulics: Presentation of software and computer tools relevant to hydrologic and hydraulic engineering problems, Theory underlying the programs, Application and evaluation of software; Introduction to Hydrologic Modeling: Concepts of open channel flow, Data requirements, Output analysis; Emphasis on Teamwork, Project Documentation and Oral Presentations. Investigation of Widely Used Computer Software in Hydrology and Hydraulics: Presentation of software and computer tools relevant to hydrologic and hydraulic engineering problems, Theory underlying the programs, Application and evaluation of software; Introduction to Hydrologic Modeling: Concepts of open channel flow, Data requirements, Output analysis; Emphasis on Teamwork, Project Documentation and Oral Presentations.

iNŞ453 Railway Engineering 3+0 4.5

Rail transport systems and their characteristics; Railway vehicles and characteristics; Equation of train's motion and applications; Route layout; Zero line; Plan and profile; Geometric characteristics of railway lines; Grades; Curves; Super elevation and transition curve; Clearance and types of cross section; Cross section and volume calculations; Mass diagrams; Earthwork balance according to General and Bruckner Method; Superstructure of railways; Rails; Sleepers; Connecting elements and ballast layer; Railways line capacity.

iNŞ453 (Eng) Railway Engineering 3+0 4.5

Rail transport systems and their characteristics; Railway vehicles and characteristics; Equation of train's motion and applications; Route layout; Zero line; Plan and profile; Geometric characteristics of railway lines; Grades; Curves; Super elevation and transition curve; Clearance and types of cross section; Cross section and volume calculations; Mass diagrams; Earthwork balance according to General and Bruckner Method; Superstructure of railways; Rails; Sleepers; Connecting elements and ballast layer; Railways line capacity.

iNŞ454 Earthquake Analysis of Structures 3+0 4.5

Earthquakes, Seismic waves; Measurement of ground motion; The concept of the earthquake zone; Earthquake magnitude and seismic energy; Richter scale; Vibration measuring instruments; Single degree of freedom systems; Multi-degree of freedom systems, earthquake motion; Strong ground motion; Identification and obtaining earthquake spectra. Design of structures against earthquakes; Design principles; Turkish Earthquake Regulation for the seismic analysis of structures. Earthquakes, Seismic waves; Measurement of ground motion; The concept of the earthquake zone; Earthquake magnitude and seismic energy; Richter scale; Vibration measuring instruments; Single degree of freedom systems; Multi-degree of freedom systems, earthquake motion; Strong ground motion; Identification and obtaining earthquake spectra.

Design of structures against earthquakes; Design principles; Turkish Earthquake Regulation for the seismic analysis of structures.

İNŞ454 (Eng) Earthquake Analysis of Structures 3+0 4.5

Earthquakes, Seismic waves; Measurement of ground motion; The concept of the earthquake zone; Earthquake magnitude and seismic energy; Richter scale; Vibration measuring instruments; Single degree of freedom systems; Multi-degree of freedom systems, earthquake motion; Strong ground motion; Identification and obtaining earthquake spectra. Design of structures against earthquakes; Design principles; Turkish Earthquake Regulation for the seismic analysis of structures. Earthquakes, Seismic waves; Measurement of ground motion; The concept of the earthquake zone; Earthquake magnitude and seismic energy; Richter scale; Vibration measuring instruments; Single degree of freedom systems; Multi-degree of freedom systems, earthquake motion; Strong ground motion; Identification and obtaining earthquake spectra. Design of structures against earthquakes; Design principles; Turkish Earthquake Regulation for the seismic analysis of structures.

İNŞ455 Highway Design 2+2 4.5

Introduction to Highway Design; Highway Systems; Characteristics of Vehicles and Drivers; Characteristics of Traffic; Geometric Characteristics of Highways: Route choice, Sight distance criterion, Zero line application, Compound and reverse curves, Horizontal alignment, Transition length and superelevation, Vertical alignment, Climbing lanes; Cross Section Elements; Cross Section and Volume Calculations; Mass Diagram; Cost of Hauling; Types of Pavements; Material Characteristics; Pavement Thickness Designation: AASHTO design method, Other pavement design approaches; Properties of Asphaltic Concrete; Retaining Walls; Surface and Subsurface Drainage; Culvert design. Introduction to Highway Design; Highway Systems; Characteristics of Vehicles and Drivers; Characteristics of Traffic; Geometric Characteristics of Highways: Route choice, Sight distance criterion, Zero line application, Compound and reverse curves, Horizontal alignment, Transition length and superelevation, Vertical alignment, Climbing lanes; Cross Section Elements; Cross Section and Volume Calculations; Mass Diagram; Cost of Hauling; Types of Pavements; Material Characteristics; Pavement Thickness Designation: AASHTO design method, Other pavement design approaches; Properties of Asphaltic Concrete; Retaining Walls; Surface and Subsurface Drainage; Culvert design.

İNŞ455 (Eng) Highway Design 2+2 4.5

Introduction to Highway Design; Highway Systems; Characteristics of Vehicles and Drivers; Characteristics of Traffic; Geometric Characteristics of Highways: Route choice, Sight distance criterion, Zero line application, Compound and reverse curves, Horizontal alignment, Transition length and superelevation, Vertical alignment, Climbing lanes; Cross Section Elements; Cross Section and Volume Calculations; Mass Diagram; Cost of Hauling; Types of Pavements; Material Characteristics; Pavement Thickness Designation: AASHTO design method, Other pavement design approaches; Properties of Asphaltic Concrete; Retaining Walls; Surface and Subsurface Drainage; Culvert design. Introduction to Highway Design; Highway Systems; Characteristics of Vehicles and Drivers; Characteristics of Traffic; Geometric Characteristics of Highways: Route choice, Sight distance criterion, Zero line application, Compound and reverse curves, Horizontal alignment, Transition length and superelevation, Vertical alignment, Climbing lanes; Cross Section Elements; Cross Section and Volume Calculations; Mass Diagram; Cost of Hauling; Types of Pavements; Material Characteristics; Pavement Thickness Designation: AASHTO design method, Other pavement design approaches; Properties of Asphaltic Concrete; Retaining Walls; Surface and Subsurface Drainage; Culvert design.

İNŞ456 Ground Water Hydrology 3+0 4.5

Introduction: Groundwater and hydrologic cycle, Groundwater as a resource, Groundwater contamination, Groundwater and geologic processes; Physical Properties and Principles: Darcy's law, Hydraulic head, Hydraulic conductivity, Porosity, Aquifers, Equations of groundwater flow, Hydrodynamic dispersion; Groundwater and Hydrologic Cycle: Steady-state groundwater flow, Steady-state hydrologic budgets, Transient groundwater flow, Infiltration and groundwater recharge. Groundwater Resource Evaluation: Development of groundwater resource, Pumping tests, Basin yield, Seawater intrusion. Groundwater contamination: Water quality standards, Transport processes, Hydrochemical behavior of contaminants, Measurement of parameters, Source of contamination. Introduction: Groundwater and hydrologic cycle, Groundwater as a resource, Groundwater contamination, Groundwater and geologic processes; Physical Properties and Principles: Darcy's law, Hydraulic head, Hydraulic conductivity, Porosity, Aquifers, Equations of groundwater flow, Hydrodynamic dispersion; Groundwater and Hydrologic Cycle: Steady-state groundwater flow, Steady-state hydrologic budgets, Transient groundwater flow, Infiltration and groundwater recharge. Groundwater Resource Evaluation: Development of groundwater resource, Pumping tests, Basin yield, Seawater intrusion. Groundwater contamination: Water quality standards, Transport processes, Hydrochemical behavior of contaminants, Measurement of parameters, Source of contamination

İNŞ456 (Eng) Ground Water Hydrology 3+0 4.5

Introduction: Groundwater and hydrologic cycle, Groundwater as a resource, Groundwater contamination, Groundwater and geologic processes; Physical Properties and Principles: Darcy's law, Hydraulic head, Hydraulic conductivity, Porosity, Aquifers, Equations of groundwater flow, Hydrodynamic dispersion; Groundwater and Hydrologic Cycle: Steady-state groundwater flow, Steady-state hydrologic budgets, Transient groundwater flow, Infiltration and groundwater recharge. Groundwater Resource Evaluation: Development of groundwater resource, Pumping tests, Basin yield, Seawater intrusion. Groundwater contamination: Water quality standards, Transport processes, Hydrochemical behavior of contaminants,

Measurement of parameters, Source of contamination Introduction: Groundwater and hydrologic cycle, Groundwater as a resource, Groundwater contamination, Groundwater and geologic processes; Physical Properties and Principles: Darcy's law, Hydraulic head, Hydraulic conductivity, Porosity, Aquifers, Equations of groundwater flow, Hydrodynamic dispersion; Groundwater and Hydrologic Cycle: Steady-state groundwater flow, Steady-state hydrologic budgets, Transient groundwater flow, Infiltration and groundwater recharge. Groundwater Resource Evaluation: Development of groundwater resource, Pumping tests, Basin yield, Seawater intrusion. Groundwater contamination: Water quality standards, Transport processes, Hydrochemical behavior of contaminants, Measurement of parameters, Source of contamination

iN\$457 Construction Cost Design 2+2 4.5

Drawings and Specifications; Drawings Reading and Analysis; Quantity Take-Off; Master Format; Unit Price and Work Breakdown Structure; Approximate Estimate; Final Estimate; Bidding Procedures; Risk Applications; Value Engineering; Unit Price Analysis; Electronic Cost Calculation Program; Web-Based Cost Calculation; Approximate Cost Applications; Cost Elements for Construction Projects; Project Delivery Methods and Bidding Processes. Drawings and Specifications; Drawings Reading and Analysis; Quantity Take-Off; Master Format; Unit Price and Work Breakdown Structure; Approximate Estimate; Final Estimate; Bidding Procedures; Risk Applications; Value Engineering; Unit Price Analysis; Electronic Cost Calculation Program; Web-Based Cost Calculation; Approximate Cost Applications; Cost Elements for Construction Projects; Project Delivery Methods and Bidding Processes.

iN\$457 (Eng) Construction Cost Design 2+2 4.5

Drawings and Specifications; Drawings Reading and Analysis; Quantity Take-Off; Master Format; Unit Price and Work Breakdown Structure; Approximate Estimate; Final Estimate; Bidding Procedures; Risk Applications; Value Engineering; Unit Price Analysis; Electronic Cost Calculation Program; Web-Based Cost Calculation; Approximate Cost Applications; Cost Elements for Construction Projects; Project Delivery Methods and Bidding Processes. Drawings and Specifications; Drawings Reading and Analysis; Quantity Take-Off; Master Format; Unit Price and Work Breakdown Structure; Approximate Estimate; Final Estimate; Bidding Procedures; Risk Applications; Value Engineering; Unit Price Analysis; Electronic Cost Calculation Program; Web-Based Cost Calculation; Approximate Cost Applications; Cost Elements for Construction Projects; Project Delivery Methods and Bidding Processes.

iN\$458 Testing of Concrete 3+0 4.5

Introduction, quality control of concrete structures; types of tests applied on concrete; strength of concrete, standard testing, preparation of test samples; semi-destructive tests; pull-out tests, pull-off tests; non-destructive tests; rebound hammer test; ultrasonic pulse velocity test; radar imaging of concrete, x-ray diffraction on concrete materials; porosity by mercury intrusion porosimetry; differential scanning calorimetry tests on concrete; maturity of concrete, estimation of concrete strength by combined methods; Project presentations.

iN\$458 (Eng) Testing of Concrete 3+0 4.5

Introduction, quality control of concrete structures; types of tests applied on concrete; strength of concrete, standard testing, preparation of test samples; semi-destructive tests; pull-out tests, pull-off tests; non-destructive tests; rebound hammer test; ultrasonic pulse velocity test; radar imaging of concrete, x-ray diffraction on concrete materials; porosity by mercury intrusion porosimetry; differential scanning calorimetry tests on concrete; maturity of concrete, estimation of concrete strength by combined methods; Project presentations.

iN\$459 Geotechnical Design 2+2 4.5

An Overview of Geotechnical Problems: In-situ and Laboratory experiments for geotechnical problems, Analysis of laboratory and in-situ experiments; Retaining Wall Projects; Sheet Pile Projects; Braced Cut Projects; Slope Stability Analysis; Shallow Foundation Projects: Single foundation projects, Combined foundation projects, Mat foundation projects; Deep foundation; Pier and caisson foundation projects; Pile foundation projects; Soil Improvement Projects; Reinforced Earth Projects. An Overview of Geotechnical Problems: In-situ and Laboratory experiments for geotechnical problems, Analysis of laboratory and in-situ experiments; Retaining Wall Projects; Sheet Pile Projects; Braced Cut Projects; Slope Stability Analysis; Shallow Foundation Projects: Single foundation projects, Combined foundation projects, Mat foundation projects; Deep foundation; Pier and caisson foundation projects; Pile foundation projects; Soil Improvement Projects; Reinforced Earth Projects.

iN\$459 (Eng) Geotechnical Design 2+2 4.5

An Overview of Geotechnical Problems: In-situ and Laboratory experiments for geotechnical problems, Analysis of laboratory and in-situ experiments; Retaining Wall Projects; Sheet Pile Projects; Braced Cut Projects; Slope Stability Analysis; Shallow Foundation Projects: Single foundation projects, Combined foundation projects, Mat foundation projects; Deep foundation; Pier and caisson foundation projects; Pile foundation projects; Soil Improvement Projects; Reinforced Earth Projects. An Overview of Geotechnical Problems: In-situ and Laboratory experiments for geotechnical problems, Analysis of laboratory and in-situ experiments; Retaining Wall Projects; Sheet Pile Projects; Braced Cut Projects; Slope Stability Analysis; Shallow Foundation Projects: Single foundation projects, Combined foundation projects, Mat foundation projects; Deep foundation; Pier and caisson foundation projects; Pile foundation projects; Soil Improvement Projects; Reinforced Earth Projects.

İNŞ460 Admixture for Concrete 3+0 4.5

Introduction, concrete properties and use of admixtures; benefits of concrete admixtures; types of admixtures; air entraining admixtures, water reducing admixtures, superplasticizers; set controlling admixtures; accelerating and retarding admixtures; mineral admixtures; pozzolans, natural pozzolans, artificial pozzolans; fly ashes, silica fumes, trass, ground granulated blast furnace slags; special types of admixtures; corrosion inhibiting admixtures, permeability reducing admixtures, coloring admixtures; Project presentations.

İNŞ460 (Eng) Admixture for Concrete 3+0 4.5

Introduction, concrete properties and use of admixtures; benefits of concrete admixtures; types of admixtures; air entraining admixtures, water reducing admixtures, superplasticizers; set controlling admixtures; accelerating and retarding admixtures; mineral admixtures; pozzolans, natural pozzolans, artificial pozzolans; fly ashes, silica fumes, trass, ground granulated blast furnace slags; special types of admixtures; corrosion inhibiting admixtures, permeability reducing admixtures, coloring admixtures; Project presentations.

İNŞ461 Structural Design for Reinforced Concrete Buildings 2+2 4.5

Factors Affecting the Choice of Concrete as the Structural Material; Structural Safety; Load Combinations and Limit States; Concrete: Concrete class and mixture proportions, Performance based concrete production; National and International Codes; Preliminary Design and Structural Carrying System; Behavior of Reinforced Concrete Structures under Earthquake Loads; Internal Force Diagrams and Use of Computer Packages, Design of Structural Members: Slab Systems, Columns, beams, Shear Walls, Stairs; Interpretation of Soil Properties and Selection of Appropriate Foundation Systems and Foundation Designs; Structural Drawings and Details.Factors Affecting the Choice of Concrete as the Structural Material; Structural Safety; Load Combinations and Limit States; Concrete: Concrete class and mixture proportions, Performance based concrete production; National and International Codes; Preliminary Design and Structural Carrying System; Behavior of Reinforced Concrete Structures under Earthquake Loads; Internal Force Diagrams and Use of Computer Packages, Design of Structural Members: Slab Systems, Columns, beams, Shear Walls, Stairs; Interpretation of Soil Properties and Selection of Appropriate Foundation Systems and Foundation Designs; Structural Drawings and Details.

İNŞ461 (Eng) Structural Design for Reinforced Concrete Buildings 2+2 4.5

Factors Affecting the Choice of Concrete as the Structural Material; Structural Safety; Load Combinations and Limit States; Concrete: Concrete class and mixture proportions, Performance based concrete production; National and International Codes; Preliminary Design and Structural Carrying System; Behavior of Reinforced Concrete Structures under Earthquake Loads; Internal Force Diagrams and Use of Computer Packages, Design of Structural Members: Slab Systems, Columns, beams, Shear Walls, Stairs; Interpretation of Soil Properties and Selection of Appropriate Foundation Systems and Foundation Designs; Structural Drawings and Details.Factors Affecting the Choice of Concrete as the Structural Material; Structural Safety; Load Combinations and Limit States; Concrete: Concrete class and mixture proportions, Performance based concrete production; National and International Codes; Preliminary Design and Structural Carrying System; Behavior of Reinforced Concrete Structures under Earthquake Loads; Internal Force Diagrams and Use of Computer Packages, Design of Structural Members: Slab Systems, Columns, beams, Shear Walls, Stairs; Interpretation of Soil Properties and Selection of Appropriate Foundation Systems and Foundation Designs; Structural Drawings and Details.

İNŞ462 Properties of Fresh and Hardened Concrete 3+0 4.5

Introduction, concrete making principles; properties of fresh concrete; workability, pumpability, placing, compacting, bleeding, segregation, setting of concrete, curing of concrete; properties of hardened concrete; strength of concrete, nature of strength of concrete, microcracking, aggregate-cement paste interface, maturity of concrete; effect of age on strength of concrete, durability of concrete, shrinkage of concrete, creep of concrete; Project presentations.

İNŞ462 (Eng) Properties of Fresh and Hardened Concrete 3+0 4.5

Introduction, concrete making principles; properties of fresh concrete; workability, pumpability, placing, compacting, bleeding, segregation, setting of concrete, curing of concrete; properties of hardened concrete; strength of concrete, nature of strength of concrete, microcracking, aggregate-cement paste interface, maturity of concrete; effect of age on strength of concrete, durability of concrete, shrinkage of concrete, creep of concrete; Project presentations.

İNŞ463 Hydraulic Design 2+2 4.5

Introduction to the Design of Hydraulic Structures for the Storage and Conveyance of Water: Canals, Culverts, Weirs, Spillways, Water Distribution Networks; Basic Principles of Hydrology, Fluid Mechanics, Hydraulics; Closed Conduits and Open Channel Flows; Hydraulics of Rivers, Waterways, Man-made Structures; Introduction to Professional Design of Hydraulic Structures; Emphasis on Teamwork, Project Documentation, Oral Presentations.Introduction to the Design of Hydraulic Structures for the Storage and Conveyance of Water: Canals, Culverts, Weirs, Spillways, Water Distribution Networks; Basic Principles of Hydrology, Fluid Mechanics, Hydraulics; Closed Conduits and Open Channel Flows; Hydraulics of Rivers, Waterways, Man-made Structures; Introduction to Professional Design of Hydraulic Structures; Emphasis on Teamwork, Project Documentation, Oral Presentations.

iN\$463 (Eng) Hydraulic Design 2+2 4.5

Introduction to the Design of Hydraulic Structures for the Storage and Conveyance of Water: Canals, Culverts, Weirs, Spillways, Water Distribution Networks; Basic Principles of Hydrology, Fluid Mechanics, Hydraulics; Closed Conduits and Open Channel Flows; Hydraulics of Rivers, Waterways, Man-made Structures; Introduction to Professional Design of Hydraulic Structures; Emphasis on Teamwork, Project Documentation, Oral Presentations. Introduction to the Design of Hydraulic Structures for the Storage and Conveyance of Water: Canals, Culverts, Weirs, Spillways, Water Distribution Networks; Basic Principles of Hydrology, Fluid Mechanics, Hydraulics; Closed Conduits and Open Channel Flows; Hydraulics of Rivers, Waterways, Man-made Structures; Introduction to Professional Design of Hydraulic Structures; Emphasis on Teamwork, Project Documentation, Oral Presentations.

iN\$464 Concrete Durability 3+0 4.5

Introduction, causes of destruction of concrete; transport of agents in concrete; pore system, absorption, permeability of concrete; sulfate attack on concrete; mechanism of attack; acid attack on concrete; mechanism of attack; effect of sea water on concrete; corrosion of reinforcement; abrasion of concrete; freezing and thawing; action of frost; effect of elevated temperatures on concrete, fire resistance of concrete; Project presentations.

iN\$464 (Eng) Concrete Durability 3+0 4.5

Introduction, causes of destruction of concrete; transport of agents in concrete; pore system, absorption, permeability of concrete; sulfate attack on concrete; mechanism of attack; acid attack on concrete; mechanism of attack; effect of sea water on concrete; corrosion of reinforcement; abrasion of concrete; freezing and thawing; action of frost; effect of elevated temperatures on concrete, fire resistance of concrete; Project presentations.

iN\$465 Steel Structural Design 2+2 4.5

History; Material; Loads on Industrial Buildings; Static Systems of Steel Industrial Buildings; Industrial Buildings with Single and Multiple Span; Special Industrial Buildings; Aeroplane Hangars; Cable Systems; Static System Properties of Tall Buildings; Investigation of Economic Structural Systems; Loads on Tall Buildings; System and Member Stability; Rigidity of Tall Buildings and Limits of Lateral Displacements; Special Beams Used in Tall Buildings. History; Material; Loads on Industrial Buildings; Static Systems of Steel Industrial Buildings; Industrial Buildings with Single and Multiple Span; Special Industrial Buildings; Aeroplane Hangars; Cable Systems; Static System Properties of Tall Buildings; Investigation of Economic Structural Systems; Loads on Tall Buildings; System and Member Stability; Rigidity of Tall Buildings and Limits of Lateral Displacements; Special Beams Used in Tall Buildings.

iN\$465 (Eng) Steel Structural Design 2+2 4.5

History; Material; Loads on Industrial Buildings; Static Systems of Steel Industrial Buildings; Industrial Buildings with Single and Multiple Span; Special Industrial Buildings; Aeroplane Hangars; Cable Systems; Static System Properties of Tall Buildings; Investigation of Economic Structural Systems; Loads on Tall Buildings; System and Member Stability; Rigidity of Tall Buildings and Limits of Lateral Displacements; Special Beams Used in Tall Buildings. History; Material; Loads on Industrial Buildings; Static Systems of Steel Industrial Buildings; Industrial Buildings with Single and Multiple Span; Special Industrial Buildings; Aeroplane Hangars; Cable Systems; Static System Properties of Tall Buildings; Investigation of Economic Structural Systems; Loads on Tall Buildings; System and Member Stability; Rigidity of Tall Buildings and Limits of Lateral Displacements; Special Beams Used in Tall Buildings.

iN\$466 (Eng) Steel Structure Project 3+0 4.5

Selection of the system; Determination of loads; Studying related codes; Design of purlin; Determination of loads acting on truss; Solution of truss under dead load, snow and wind load; Design of truss members; Weld calculations of truss; Design of columns and horizontal members; Foundation calculation; Drawings.

iN\$467 (Eng) Construction Equipments 3+0 4.5

Basic concepts about construction equipments; Reasons to use construction equipments; Use and maintenance of construction equipments; Selection of equipments in construction projects; Construction equipments management; Organization of construction equipments; Cost of operating construction equipments; Safety in construction equipments; Construction equipment accidents; Safety requirements for construction equipment. Basic concepts about construction equipments; Reasons to use construction equipments; Use and maintenance of construction equipments; Selection of equipments in construction projects; Construction equipments management; Organization of construction equipments; Cost of operating construction equipments; Safety in construction equipments; Construction equipment accidents; Safety requirements for construction equipment.

iN\$468 Computer-Based Project Management 3+0 4.5

Introduction to planning; Types and reasons of planning; Project Planning and control using computer; Project communication using computer; Computer-Based resource-cost planning; Relations between activities; Risk factors in planning; Short-Middle-Long term planning.

iNŞ468 (Eng) Computer-Based Project Management 3+0 4.5

Introduction to planning; Types and reasons of planning; Project Planning and control using computer; Project communication using computer; Computer-Based resource-cost planning; Relations between activities; Risk factors in planning; Short-Middle-Long term planning.

iNŞ469 (Eng) Renewable Energy with Water, Wind and Wave Power 3+0 4.5

Introduction to renewable energy; Energy consumption, recent data; Global energy crisis; Energy production: introduction to renewable energy resources, hydropower, energy from wind power, energy from wave power; new energy production methods; Cost of energy generation; Global and Turkish renewable energy policies, Energy related investments in Turkey. Introduction to renewable energy; Energy consumption, recent data; Global energy crisis; Energy production: introduction to renewable energy resources, hydropower, energy from wind power, energy from wave power; new energy production methods; Cost of energy generation; Global and Turkish renewable energy policies, Energy related investments in Turkey.

iNŞ470 Concrete Technology 3+0 4.5

Ordinary Concrete Technology; New Developing Concrete Materials; Additive Materials; Quality Assurance and Quality Control; Special Production Technologies; Concrete Pouring in Extreme Weather Conditions (Hot and Cold Weather); Ready Mixed Concrete; Pump Concrete; Shotcrete; Injection Mortar; Vacuum Concrete; Concrete Under Water; Heat Treatment Application in Prefabrication; Massive Concrete and Roller Compacted Concrete; Light Weight Concrete; Highway and Airport Concrete. Ordinary Concrete Technology; New Developing Concrete Materials; Additive Materials; Quality Assurance and Quality Control; Special Production Technologies; Concrete Pouring in Extreme Weather Conditions (Hot and Cold Weather); Ready Mixed Concrete; Pump Concrete; Shotcrete; Injection Mortar; Vacuum Concrete; Concrete Under Water; Heat Treatment Application in Prefabrication; Massive Concrete and Roller Compacted Concrete; Light Weight Concrete; Highway and Airport Concrete.

iNŞ470 (Eng) Concrete Technology 3+0 4.5

Ordinary Concrete Technology; New Developing Concrete Materials; Additive Materials; Quality Assurance and Quality Control; Special Production Technologies; Concrete Pouring in Extreme Weather Conditions (Hot and Cold Weather); Ready Mixed Concrete; Pump Concrete; Shotcrete; Injection Mortar; Vacuum Concrete; Concrete Under Water; Heat Treatment Application in Prefabrication; Massive Concrete and Roller Compacted Concrete; Light Weight Concrete; Highway and Airport Concrete. Ordinary Concrete Technology; New Developing Concrete Materials; Additive Materials; Quality Assurance and Quality Control; Special Production Technologies; Concrete Pouring in Extreme Weather Conditions (Hot and Cold Weather); Ready Mixed Concrete; Pump Concrete; Shotcrete; Injection Mortar; Vacuum Concrete; Concrete Under Water; Heat Treatment Application in Prefabrication; Massive Concrete and Roller Compacted Concrete; Light Weight Concrete; Highway and Airport Concrete.

iNŞ471 (Eng) Numerical Modeling in Hydrology and Hydraulics 2+2 4.5

Programming with QuickBASIC: QuickBASIC compiler, Reading and writing data, Dimensional variables, Loops, Conditional statements; Monthly Dam Reservoir Budget Calculation; Calculating Normal and Critical Depths in Open Channels by Using Numerical Methods; Correcting the Inhomogeneous Records of a Hydrological Station; Filling the Missing Data of a Hydrological Station by Regression; Calculating the Water Surface Profiles in Open Channels by Using Numerical Methods: Cross section changes, Gradually varied flow; Flood Routing in Open Channels: Muskingum approach, Saint-Venant equation approach.

iNŞ472 Introduction to Traffic 3+0 4.5

Introduction to Traffic Engineering; Traffic Flow Characteristics; Characteristics of Traffic; Fundamental Models of Traffic Flow; Statistical Aspects of Traffic Flow; Traffic Study and Evaluation; Count and Observation Techniques; Inquiry and Forecast Techniques: Intersections, Design Characteristics of Intersections; Capacity / performance Analysis, Signalized Inter-sections, Traffic Signs and Signing, Traffic Safety.

iNŞ472 (Eng) Introduction Traffic Engineering 3+0 4.5

Introduction to Traffic Engineering; Traffic Flow Characteristics; Characteristics of Traffic; Fundamental Models of Traffic Flow; Statistical Aspects of Traffic Flow; Traffic Study and Evaluation; Count and Observation Techniques; Inquiry and Forecast Techniques: Intersections, Design Characteristics of Intersections; Capacity / performance Analysis, Signalized Inter-sections, Traffic Signs and Signing, Traffic Safety.

iNŞ473 Timber Structures 3+0 4.5

Introduction: Brief history, advantages and disadvantages; Characteristics and Classifications of Wood: Density, Material defects, Moisture content; Unit Stresses; Working Stresses for Structural Members; Properties of Sections; Bending Moments and Shear; Shearing stress in beams; Compression Perpendicular to Grain; Deflection of Beams; Design of Timber Connections: Joint slip, Effective cross-section, Spacing rules, Nailed joints, Screwed joints, Bolted and dowelled joints, Connected joints, Glued joints; Design of Flexural Members: Bending stress and prevention of lateral buckling, Deflection,

Bearing stress, Shear stress; Design of Axially Loaded Members: Design of compression members, Slenderness ratio; Wind effect.

İNŞ474 Tunnels 3+0 4.5

Substructures; Stability of Substructure Body: Preventing Slides; Types of Protection Construction: Retaining Walls, Cover Walls, Gutters, Ripraps, Snow Fences, Substructure for Passing Rivers, Culverts, Tunnels: Definition and History, Tunnel Investigations, Pressures on Tunnels, Cover Dimension and Forms, Galleries, Shafts, Methods of Tunnel Construction, Special Tunneling Methods.

İNŞ474 (Eng) Tunnels 3+0 4.5

Substructures; Stability of Substructure Body: Preventing Slides; Types of Protection Construction: Retaining Walls, Cover Walls, Gutters, Ripraps, Snow Fences, Substructure for Passing Rivers, Culverts, Tunnels: Definition and History, Tunnel Investigations, Pressures on Tunnels, Cover Dimension and Forms, Galleries, Shafts, Methods of Tunnel Construction, Special Tunneling Methods.

İNŞ475 Multi-Story Steel Structure Design 3+0 4.5

Introduction: Definition of a tall building, Lateral load design philosophy, Concept of premium for height; Wind Effects: Design considerations, Extreme wind conditions, Code wind loads; Seismic Design: Tall building behavior during earthquakes, Philosophy of earthquake design, Dynamic approach; Steel Buildings: Introduction, Semi-rigid frames, Rigid frames, Braced frames, Eccentric bracing systems, Framed tube systems, Trussed framed systems.

İNŞ476 Project Planning with Primavera and MS Project 3+0 4.5

Introduction to Primavera; Reasons of using Primavera, its advantages, disadvantages; Dividing the project; Special data sections; Dividing cost calculations; Resource balancing; Managing more than one project; Late times and free float calculations; Defining activities; Relations between activities in Primavera; Resource and budget planning with Primavera.

İNŞ476 (Eng) Project Planning with Primavera and MS Project 3+0 4.5

Introduction to Primavera; Reasons of using Primavera, its advantages, disadvantages; Dividing the project; Special data sections; Dividing cost calculations; Resource balancing; Managing more than one project; Late times and free float calculations; Defining activities; Relations between activities in Primavera; Resource and budget planning with Primavera.

İNŞ478 Construction Cost Analysis and Estimating 3+0 4.5

Introduction to Construction Cost; Definition of Cost Analysis; Bidding Law; Bidding Qualification; Optimum Proposal Preparation; Bid Bond; Performance Bond; Final Cost; Project Acceptance; Blue-Print Reading; Material Resources; Total Project Cost.

İNŞ478 (Eng) Construction Cost Analysis And Estimating 3+0 4.5

Introduction to Construction Cost; Definition of Cost Analysis; Bidding Law; Bidding Qualification; Optimum Proposal Preparation; Bid Bond; Performance Bond; Final Cost; Project Acceptance; Blue-Print Reading; Material Resources; Total Project Cost.

İNŞ480 Concrete Making Materials 3+0 4.5

Introduction, concrete making, concrete casting; cements; types of cements, manufacture of cementitious materials; Portland cement, properties of Portland cement, tests on properties of Portland cement; pozzolanic materials; types of pozzolanic materials, artificial and natural pozzolans; effects of pozzolans on properties of fresh and hardened concrete; aggregates; types of aggregate, properties of aggregate; effects of aggregate type and properties on concrete properties; water; mixing water, properties of mixing water; admixtures; classification of admixtures, purpose of use of admixtures in concrete; Project presentations.

İNŞ480 (Eng) Concrete Making Materials 3+0 4.5

Introduction, concrete making, concrete casting; cements; types of cements, manufacture of cementitious materials; Portland cement, properties of Portland cement, tests on properties of Portland cement; pozzolanic materials; types of pozzolanic materials, artificial and natural pozzolans; effects of pozzolans on properties of fresh and hardened concrete; aggregates; types of aggregate, properties of aggregate; effects of aggregate type and properties on concrete properties; water; mixing water, properties of mixing water; admixtures; classification of admixtures, purpose of use of admixtures in concrete; Project presentations.

İNŞ481 Soil Mechanics II 3+0 4.5

Shear Strength of Soil, Bearing Capacity of Shallow Foundations; Stress Distribution in Soil; Consolidation Theory: Finding Coefficient of Consolidation with Square-root-of time and logarithm-of-time; Drained and Undrained Loading in Soil; Computing of Settlement for Load Conditions; Settlement Boundaries for Structures; Calculations of Earth Pressure,

Retaining Walls, Slope Stability. Shear Strength of Soil, Bearing Capacity of Shallow Foundations; Stress Distribution in Soil; Consolidation Theory: Finding Coefficient of Consolidation with Square-root-of time and logarithm-of-time; Drained and Undrained Loading in Soil; Computing of Settlement for Load Conditions; Settlement Boundaries for Structures; Calculations of Earth Pressure, Retaining Walls, Slope Stability.

iN\$481 (Eng) Soil Mechanics II 3+0 4.5

Shear Strength of Soil, Bearing Capacity of Shallow Foundations; Stress Distribution in Soil; Consolidation Theory: Finding Coefficient of Consolidation with Square-root-of time and logarithm-of-time; Drained and Undrained Loading in Soil; Computing of Settlement for Load Conditions; Settlement Boundaries for Structures; Calculations of Earth Pressure, Retaining Walls, Slope Stability. Shear Strength of Soil, Bearing Capacity of Shallow Foundations; Stress Distribution in Soil; Consolidation Theory: Finding Coefficient of Consolidation with Square-root-of time and logarithm-of-time; Drained and Undrained Loading in Soil; Computing of Settlement for Load Conditions; Settlement Boundaries for Structures; Calculations of Earth Pressure, Retaining Walls, Slope Stability.

iN\$482 Ground Improvement 3+0 4.5

Preloading; Vertical Drains; Deep Compaction of Cohesion less Soils: Vibrofloatation, Vibratory probes, Compaction piles, Dynamic compaction, Blasting; Grouting: Permeating grouting, Compaction grouting; Chemical grouting. Jet grouting; Soil Reinforcement: Soil nailing, Micro piles, Reinforced earth, Stone columns, Lime columns, Geotextiles, Freezing, Electro-osmosis. Preloading; Vertical Drains; Deep Compaction of Cohesion less Soils: Vibrofloatation, Vibratory Probes, Compaction Piles, Dynamic Compaction, Blasting; Grouting: Permeating Grouting, Compaction Grouting; Chemical Grouting. Jet Grouting; Soil Reinforcement: Soil Nailing, Micro Piles, Reinforced Earth, Stone Columns, Lime Columns, Geotextiles, Freezing, Electro-osmosis.

iN\$482 (Eng) Ground Improvement 3+0 4.5

Preloading; Vertical Drains; Deep Compaction of Cohesion less Soils: Vibrofloatation, Vibratory probes, Compaction piles, Dynamic compaction, Blasting; Grouting: Permeating grouting, Compaction grouting; Chemical grouting. Jet grouting; Soil Reinforcement: Soil nailing, Micro piles, Reinforced earth, Stone columns, Lime columns, Geotextiles, Freezing, Electro-osmosis. Preloading; Vertical Drains; Deep Compaction of Cohesion less Soils: Vibrofloatation, Vibratory Probes, Compaction Piles, Dynamic Compaction, Blasting; Grouting: Permeating Grouting, Compaction Grouting; Chemical Grouting. Jet Grouting; Soil Reinforcement: Soil Nailing, Micro Piles, Reinforced Earth, Stone Columns, Lime Columns, Geotextiles, Freezing, Electro-osmosis.

iN\$483 Retaining Structures 3+0 4.5

Highway and Railway Fills; Earth Dams; General Principles of Design; Choice of Dam Type. Circular arc Method of Stability Analysis; Prediction of Pore Pressures During Construction: Steady Seepage and Rapid Draw Down; Special Methods of Analysis for Puddle Core and Rock Fill Dams; Design in Earthquake Areas. Highway and Railway Fills; Earth Dams; General Principles of Design; Choice of Dam Type. Circular arc Method of Stability Analysis; Prediction of Pore Pressures During Construction: Steady Seepage and Rapid Draw Down; Special Methods of Analysis for Puddle Core and Rock Fill Dams; Design in Earthquake Areas.

iN\$483 (Eng) Retaining Structures 3+0 4.5

Highway and Railway Fills; Earth Dams; General Principles of Design; Choice of Dam Type. Circular arc Method of Stability Analysis; Prediction of Pore Pressures During Construction: Steady Seepage and Rapid Draw Down; Special Methods of Analysis for Puddle Core and Rock Fill Dams; Design in Earthquake Areas. Highway and Railway Fills; Earth Dams; General Principles of Design; Choice of Dam Type. Circular arc Method of Stability Analysis; Prediction of Pore Pressures During Construction: Steady Seepage and Rapid Draw Down; Special Methods of Analysis for Puddle Core and Rock Fill Dams; Design in Earthquake Areas.

iN\$484 Foundation Engineering II 3+0 4.5

Protection of Used Materials in Foundation Construction: Ground improvement, Protection of foundation hole against underground water and surface water, Cofferdams; Keeping Dry of Foundation Hole; Insitu Experiments and Evaluation; Calculations of Shallow Foundations; Methods of Rigid and Flexible Computation; Single. Strip and Mat foundations; Deep foundation: Group piles, Calculation of piles according to horizontal loads; Specific Foundations. Protection of Used Materials in Foundation Construction: Ground Improvement, Protection of Foundation Hole Against Underground and surface water, Cofferdams; Keeping Dry of Foundation Hole; Insitu Experiments and Evaluation; Calculations of Shallow Foundations; Methods of Rigid and Flexible Computation; Single. Strip and Mat foundations; Deep foundation: Group piles, Calculation of piles under horizontal loads; Specific Foundations.

iN\$484 (Eng) Foundation Engineering II 3+0 4.5

Protection of Used Materials in Foundation Construction: Ground improvement, Protection of foundation hole against underground water and surface water, Cofferdams; Keeping Dry of Foundation Hole; Insitu Experiments and Evaluation; Calculations of Shallow Foundations; Methods of Rigid and Flexible Computation; Single. Strip and Mat foundations; Deep foundation: Group piles, Calculation of piles according to horizontal loads; Specific Foundations. Protection of Used

pollution in soil; Micro-Structure Properties of Soil: Scanning electron microscopy, X-Ray analysis; Improvement of Polluted Soil: Stabilization/Solidification Methods: Fly ash, lime, cement and asphalt stabilization, Sanitary landfill design.

iN\$489 (Eng) Open Channel Hydraulics 3+0 4.5

General Equation of Gradually Varied Flows (GVF); Types of Channel Slopes; Characteristics and Classification of GVF Profiles; Solution of GVF Equations; Characteristics of Rapidly Varied Flow; Flow Over Spillways; Crest Shape and Discharge of Overflow Spillways; Basic Characteristics of Jump; Flow Measurement in Open Channel; Types of Flow Measurement Structures; Sharp, Short and Broad Crested Weirs.

iN\$490 Coastal and Port Engineering 3+0 4.5

Introduction to Coastal and Port Engineering; Sea Waves; Methods of Wave Prediction; Variation of Waves in Coastal Area; Wave Energy and Wave Force; Coastal Currents; Motion of Coastal Sediments Transport; Effect of Sea Water to Coastal Structure Materials; Protective Coastal Structure; Properties of Ports and General Design Principles; Unit System in Port; Breakwaters: Types of structure, project and Principles of calculations; Quay and Jetties.

iN\$490 (Eng) Coastal and Port Engineering 3+0 4.5

Introduction to Coastal and Port Engineering; Sea Waves; Methods of Wave Prediction; Variation of Waves in Coastal Area; Wave Energy and Wave Force; Coastal Currents; Motion of Coastal Sediments Transport; Effect of Sea Water to Coastal Structure Materials; Protective Coastal Structure; Properties of Ports and General Design Principles; Unit System in Port; Breakwaters: Types of structure, project and Principles of calculations; Quay and Jetties.

iN\$492 Water Resources Engineering 3+0 4.5

Classification of Dams: Types of spillways, Crest gates, Outlet works; Uses, Quantities, Characteristics and quality of water; Treatment and Distribution System; Characteristics; Collection, Treatment and Management of Wastewater; Soil-Water Relationships; Irrigation Methods; Drainage Flow and Land Drainage; Municipal Storm and Highway Drainage; Culverts and Bridge Waterways; Hydroelectric Power Plants; Turbines; Operation, Planning.

iN\$492 (Eng) Water Resources Engineering 3+0 4.5

Classification of Dams: Types of spillways, Crest gates, Outlet works; Uses, Quantities, Characteristics and quality of water; Treatment and Distribution System; Characteristics; Collection, Treatment and Management of Wastewater; Soil-Water Relationships; Irrigation Methods; Drainage Flow and Land Drainage; Municipal Storm and Highway Drainage; Culverts and Bridge Waterways; Hydroelectric Power Plants; Turbines; Operation, Planning.

iN\$494 Civil Engineering Construction 3+0 4.5

Fundamental Principles for System; Introduction and Selection and Introduction to Analytic Operation; Mathematical Optimised Theory in Engineering Issue and Systematic Investigation of Applications; Solution Development of Single and Multi-purposes Problems; Usage Theory; Statistical Decision-support System; Uncertainty and Risk analysis; Design for Uncertainty and Failure. Fundamental Principles of Systems; Investigation of Introduction to Analytic Operation; Mathematical Optimization Theory in Engineering Problems and its Applications; Solving of Single and Multi-purpose Problems; Use Theory; Statistical Decision-support System; Uncertainty and Risk analysis; Design for Uncertainty and Failure.

iN\$494 (Eng) Construction in Civil Engineering 3+0 4.5

Fundamental Principles for System; Introduction and Selection and Introduction to Analytic Operation; Mathematical Optimised Theory in Engineering Issue and Systematic Investigation of Applications; Solution Development of Single and Multi-purposes Problems; Usage Theory; Statistical Decision-support System; Uncertainty and Risk analysis; Design for Uncertainty and Failure. Fundamental Principles of Systems; Investigation of Introduction to Analytic Operation; Mathematical Optimization Theory in Engineering Problems and its Applications; Solving of Single and Multi-purpose Problems; Use Theory; Statistical Decision-support System; Uncertainty and Risk analysis; Design for Uncertainty and Failure.

iN\$495 Highway Pavements 3+0 4.5

Definition of Highway Pavement and Introduction; Stresses in Flexible Pavements: Traffic load, Design of highway pavements; Flexible Pavements: Design methods and laboratory tests; Rigid Pavement: Design methods, Properties of pavement components; Properties of Aggregates and Bituminous; Quality Control Test of Materials; Flexible, Asphalt and Concrete Pavement Construction.

iN\$495 (Eng) Highway Pavements 3+0 4.5

Definition of Highway Pavement and Introduction; Stresses in Flexible Pavements: Traffic load, Design of highway pavements; Flexible Pavements: Design methods and laboratory tests; Rigid Pavement: Design methods, Properties of pavement components; Properties of Aggregates and Bituminous; Quality Control Test of Materials; Flexible, Asphalt and Concrete Pavement Construction.

iN\$496 (Eng) Construction Planning and Management 3+0 4.5

Project Management and Organisation: Application-organisation of construction management; Construction Engineering and Marketing Applications; Long-Short Fixed Term Strategic Marketing Planning; Using Financial Sources in Civil Engineering; International Construction Market; Communication and Concepts of Sales Marketing. Project Management and Organization: Application-organization of construction management; Construction Engineering and Marketing Applications; Long-Short Term Strategic Marketing Planning; Using Financial Sources in Civil Engineering; International Construction Market; Communication and Concepts of Sales Marketing.

iN\$498 (Eng) Introduction to Structural Dynamics 3+0 4.5

Introduction; Reasons and Preventives of Dynamic Disturbance; Single and Multiple Degree of Freedom Systems; Continuous Systems; Motion Equations; Theoretical Explanations and Solutions; Energy Methods in Structural Dynamics; Applications in Structural Dynamics; Areas of Structural Dynamics; Earthquake Engineering; Project against Explosion; Random Vibrations; Reactions of Structures against Earthquake; Preventives; Estimations and Criteria of Damage Determination.

iSG401 Occupational Health and Safety I 2+0 2.0

Overview of Occupational Health and Safety: Scope, Importance, Related concepts; Workplace Accidents and Occupational Diseases: Reasons, Precautions, Costs; Occupational Health and Safety: Responsible institutions, Problems in applications, Legal basis for occupational safety, Legislation, Regulations for employers; Legal Responsibility of Employers for Workplace Accidents and Occupational Diseases: Liability concept, Regulations for employer responsibility.

iSG402 Occupational Health and Safety II 2+0 2.0

Compensation Claims for Occupational Health and Safety: Compensation types; Legislation for Employers not Abide by Occupational Health and Safety Instructions: Administrative sanctions, Criminal sanctions, Investigations for workplace accidents; Organization in Workplace for Occupational Health and Safety: Employee representative, Obligation for constituting board for occupational health and safety, Workplace health and safety board; International Legislation for Occupational Health and Safety: International legislation, European legislation, Comparison of national and international legislation.

iSN309 Mass Media 3+0 3.0

Concept of the Mass Media; Emergence of Mass Media; Historical Development of Mass Media Research; Liberal and Critical Approaches to Mass Media; Optimistic Approach to Mass Media: Marshall McLuhan; Pessimistic Approach to Mass Media: Herbert Marcuse; Quasi Optimistic Approach to Mass Media: Alvin Toffler; Ideological Function of Mass Media; Globalization and Consumer Society; Advertising and Consumer Society; News and Reality; Myth Production in Mass Media: Advertising, TV, News; Discussions on Information Society: Internet and the Problem of Participation; Media and Women; Media and Democracy. Concept of the Mass Media; Emergence of Mass Media; Historical Development of Mass Media Research; Liberal and Critical Approaches to Mass Media; Optimistic Approach to Mass Media: Marshall McLuhan; Pessimistic Approach to Mass Media: Herbert Marcuse; Quasi Optimistic Approach to Mass Media: Alvin Toffler; Ideological Function of Mass Media; Globalization and Consumer Society; Advertising and Consumer Society; News and Reality; Myth Production in Mass Media: Advertising, TV, News; Discussions on Information Society: Internet and the Problem of Participation; Media and Women; Media and Democracy.

iSN309 (Eng) Mass Media 3+0 3.0

Concept of the Mass Media; Emergence of Mass Media; Historical Development of Mass Media Research; Liberal and Critical Approaches to Mass Media; Optimistic Approach to Mass Media: Marshall McLuhan; Pessimistic Approach to Mass Media: Herbert Marcuse; Quasi Optimistic Approach to Mass Media: Alvin Toffler; Ideological Function of Mass Media; Globalization and Consumer Society; Advertising and Consumer Society; News and Reality; Myth Production in Mass Media: Advertising, TV, News; Discussions on Information Society: Internet and the Problem of Participation; Media and Women; Media and Democracy. Concept of the Mass Media; Emergence of Mass Media; Historical Development of Mass Media Research; Liberal and Critical Approaches to Mass Media; Optimistic Approach to Mass Media: Marshall McLuhan; Pessimistic Approach to Mass Media: Herbert Marcuse; Quasi Optimistic Approach to Mass Media: Alvin Toffler; Ideological Function of Mass Media; Globalization and Consumer Society; Advertising and Consumer Society; News and Reality; Myth Production in Mass Media: Advertising, TV, News; Discussions on Information Society: Internet and the Problem of Participation; Media and Women; Media and Democracy.

iSP151 (Spa) Spanish I 4+0 4.0

Introduction: Greeting, Giving information; Gender in Nouns and Adjectives; Verbs in the Present Tense; Demonstrative Adjectives and Pronouns; Plural Forms of Nouns and Adjectives; Description: House, Objects, Numbers; Asking Questions; Asking for Directions and the Time; Verbs in the Present Progressive Tense; At a Restaurant: Ordering, Asking for the Bill, Talking about Preferences; Describing People; Reflexive Verbs; Shopping: Cost, Likes and Dislikes, Quantity; Invitation: Accepting, Refusing; Gerunds; Seasons.

iSP152 (Spa) Spanish II 4+0 4.0

The Past: Near and remote past, Prepositions, Indefinite pronouns; The Future: Future plans, Making a phone call, Comparison; The Future Perfect Tense; Habits in the Past; Regular and Irregular Verbs; Senses; Some Grammar Rules: Obligation, Personal pronouns, Passive construction, conjunctions; Reading Texts: Biography, Narration, Picture stories.

iST201 Statistics 3+0 3.0

Definition of Statistics: Data collection; Data Presentation Techniques, Distribution theory; Sampling: Errors, Estimation of population parameters; Hypothesis Testing: Hypothesis testing for two populations, Comparisons of ratios, Hypothesis testing for large and small samples; The Chi-Square Distribution and Chi-Square Testing; Correlation: Simple linear correlation coefficient, Regression coefficient, Forecasting, Determination coefficient. Definition of Statistics: Data collection; Data Presentation Techniques, Distribution theory; Sampling: Errors, Estimation of population parameters; Hypothesis Testing: Hypothesis testing for two populations, Comparisons of ratios, Hypothesis testing for large and small samples; The Chi-Square Distribution and Chi-Square Testing; Correlation: Simple linear correlation coefficient, Regression coefficient, Forecasting, Determination coefficient.

iST201 (Eng) Statistics 3+0 3.0

Definition of Statistics: Data collection; Data Presentation Techniques, Distribution theory; Sampling: Errors, Estimation of population parameters; Hypothesis Testing: Hypothesis testing for two populations, Comparisons of ratios, Hypothesis testing for large and small samples; The Chi-Square Distribution and Chi-Square Testing; Correlation: Simple linear correlation coefficient, Regression coefficient, Forecasting, Determination coefficient. Definition of Statistics: Data collection; Data Presentation Techniques, Distribution theory; Sampling: Errors, Estimation of population parameters; Hypothesis Testing: Hypothesis testing for two populations, Comparisons of ratios, Hypothesis testing for large and small samples; The Chi-Square Distribution and Chi-Square Testing; Correlation: Simple linear correlation coefficient, Regression coefficient, Forecasting, Determination coefficient.

iST237 Programming With MATLAB 4+0 4.0

Introduction to MATLAB Programing; Fundamental MATLAB Operations and Commands; Algorithm and Programing Logic in MATLAB; Data Processing, Reading and Writing in MATLAB; File Types; M-files: Creating and using functions by using M-files; Program Control Commands, Conditional Control, Loop Control; Matrix and Vector Operations, Functions, Numerical Methods: Root Finding with MATLAB; Drawing Two- and Three Dimensional Graphics with MATLAB; Program Examples in MATLAB for Statistical Applications.

iST244 Engineering Probability 3+0 5.0

Combinatorial Analysis: Permutations, Combinations; Axioms of Probability: Sample Space and Events; Conditional Probability and Independence: Bayes' Formula, Independent Events; Discrete Random Variables: Expected Value, Variance, the Bernoulli and the Binomial Random Variables, the Poisson Random Variable, the Geometric Random Variables, Properties of the Cumulative Distribution Function; Continuous Random Variables: the Uniform Random Variable, Normal Random Variables, the Normal Approximation to the Binomial Distribution, Exponential Random Variables; Jointly Distributed Random Variables: Independent Random Variables, Sums of Independent Random Variables, Order Statistics; Conditional Expectation: Computing Probabilities by Conditioning, Conditional Variance; Conditional Expectation and Prediction; Moment Generating Functions; the Chebyshev's Inequality and the Weak Law of Large Numbers; the Central Limit Theorem; the Strong Law of Large Numbers; Other Inequalities: the One-sided Chebyshev Inequality, the Chernoff Bounds, the Jensen's Inequality; the Poisson Process; Markov Chains.

iST244 (Eng) Engineering Probability 3+0 5.0

Combinatorial Analysis: Permutations, Combinations; Axioms of Probability: Sample Space and Events; Conditional Probability and Independence: Bayes' Formula, Independent Events; Discrete Random Variables: Expected Value, Variance, the Bernoulli and the Binomial Random Variables, the Poisson Random Variable, the Geometric Random Variables, Properties of the Cumulative Distribution Function; Continuous Random Variables: the Uniform Random Variable, Normal Random Variables, the Normal Approximation to the Binomial Distribution, Exponential Random Variables; Jointly Distributed Random Variables: Independent Random Variables, Sums of Independent Random Variables, Order Statistics; Conditional Expectation: Computing Probabilities by Conditioning, Conditional Variance; Conditional Expectation and Prediction; Moment Generating Functions; the Chebyshev's Inequality and the Weak Law of Large Numbers; the Central Limit Theorem; the Strong Law of Large Numbers; Other Inequalities: the One-sided Chebyshev Inequality, the Chernoff Bounds, the Jensen's Inequality; the Poisson Process; Markov Chains.

iST252 (Eng) Probability and Statistics 3+0 4.0

Data Representation: Average, Spread, Experiments, Events; Probability: Permutations and combinations, Random variables, Probability distributions, Mean and variance of a distribution, Binomial, Poisson and hypergeometric distributions, Normal distribution, Multivariate distribution, Random sampling, Point estimation of parameters, Confidence intervals, Testing hypothesis, Decisions, Quality control, Acceptance sampling, Goodness of fit, X2 tests, Nonparametric tests, Regression, Fitting straight lines, Correlation.

iST255 (Eng) Engineering Statistics 2+0 3.0

Data: Classified data; Mean; Distribution Measurements; Sampling: Sampling error, Sampling distribution, t Distribution, F Distribution, Chi-Square test; Statistical Estimation: Estimation of population parameter, Point estimation, Confidence interval estimation; Hypothesis Testing: Hypothesis tests for means, Proportions and variances, Hypothesis testing for small and large samples.

iST401 Multivariate Statistics I 3+0 4.5

Overview of Matrix Theory: Minitab and Mat lab Applications; Multivariate Gaussian Distribution and Properties; Hotelling's T2 Test: Hypothesis testing and interval estimation for multivariate data, Hypothesis testing for two independent multivariate populations, Interval estimation for two mean vectors, SPSS and Minitab applications; Multivariate Variance Analysis: One-way multivariate variance analysis, Multiple comparisons, Two-way multivariate variance analysis.

iST402 Multivariate Statistics II 3+0 4.0

Multivariate Linear Regression Analysis: Simple linear and multiple linear and multivariate regression analysis, Tests for regression coefficients; Principal Component Analysis: Principal component matrices for principal components; Factor Analysis: Factor models, Estimation of factors, Factor coefficients and scores, Factor transformation; Cluster Analysis: Distance, Standardization and transformation of variables, Clustering methods; Discriminant Analysis; Multidimensional Scaling and Computer Applications

iST411 Time Series Analysis 4+0 5.0

Definition and Properties of Time Series; Purposes of Time Series Analysis; Classification of Time Series: Stationary and non-stationary time series, seasonal and non-seasonal series; Forecasting in Time Series Analysis by Using One Variable Technique: Trend analysis, Moving averages, Exponential smoothing; Linear Stationary Stochastic Models: AR and MA models; Non-Stationary Linear Stochastic Models: ARIMA models, Seasonal models.

iST411 (Eng) Time Series Analysis 4+0 5.0

Definition and Properties of Time Series; Purposes of Time Series Analysis; Classification of Time Series: Stationary and non-stationary time series, seasonal and non-seasonal series; Forecasting in Time Series Analysis by Using One Variable Technique: Trend analysis, Moving averages, Exponential smoothing; Linear Stationary Stochastic Models: AR and MA models; Non-Stationary Linear Stochastic Models: ARIMA models, Seasonal models.

iST415 Reliability Analysis 3+0 5.0

Fundamental Concepts of Reliability: Failure rate function, Cumulative failure rate function and bathtub curve, Conditional reliability and mean time to failure; Constant Failure Rate Model: Two-parameter exponential distribution; Time-dependent Failure Models: Weibull distribution, Normal distribution and Lognormal distribution; Reliability of Systems: Series systems, Parallel systems, Series-parallel systems; Implementation of Survival Analysis in Reliability; Exponential and Weibull Models in Survival Analysis; Kaplan-Meier Method and Cox Regression Analysis.

iJL101 Introduction to Business 3+0 4.5

Concept of business: Economic systems, Production factors, Needs and wants, Demand, Goods and services, Consumption and consumer; Success criterion: Efficiency and related concepts; Characteristics of Businesses: Goals and functions of businesses, Relationships with the environment and responsibilities of businesses, Grouping of businesses; Foundation of businesses: Foundation decision, Determining plant location; Extending Businesses; Business ethics and social responsibility (Ethical and moral rules); Concept of management; Functions of management; Human resources management; Functions of human resources management; Principles of marketing. Concept of business: Economic systems, Production factors, Needs and wants, Demand, Goods and services, Consumption and consumer; Success criterion: Efficiency and related concepts; Characteristics of Businesses: Goals and functions of businesses, Relationships with the environment and responsibilities of businesses, Grouping of businesses; Foundation of businesses: Foundation decision, Determining plant location; Extending Businesses; Business ethics and social responsibility (Ethical and moral rules); Concept of management; Functions of management; Human resources management; Functions of human resources management; Principles of marketing.

iJL101 (Eng) Introduction to Business 3+0 4.5

Concept of business: Economic systems, Production factors, Needs and wants, Demand, Goods and services, Consumption and consumer; Success criterion: Efficiency and related concepts; Characteristics of Businesses: Goals and functions of businesses, Relationships with the environment and responsibilities of businesses, Grouping of businesses; Foundation of businesses: Foundation decision, Determining plant location; Extending Businesses; Business ethics and social responsibility (Ethical and moral rules); Concept of management; Functions of management; Human resources management; Functions of human resources management; Principles of marketing. Concept of business: Economic systems, Production factors, Needs and wants, Demand, Goods and services, Consumption and consumer; Success criterion: Efficiency and related concepts; Characteristics of Businesses: Goals and functions of businesses, Relationships with the environment and responsibilities of businesses, Grouping of businesses; Foundation of businesses: Foundation decision, Determining plant location; Extending Businesses; Business ethics and social responsibility (Ethical and moral rules);

Concept of management; Functions of management; Human resources management; Functions of human resources management; Principles of marketing.

işL103 (Eng) Business Management 3+0 3.5

Management: Basic Concepts, Significance of Management for Business Enterprises; Comparison of Management with Similar Concepts; Development of Management Science: Classical, Behavioral, and Modern Theories; Management System: Fundamentals and Significance of Management System for Business Enterprises; Planning and Decision Making: Planning process ,Types of Plans; Organization: Fundamentals, Organization Process, Comparison of organization and planning processes; Authority and Power: Characteristics and Importance of Authority and Power, Delegation of Authority; Controlling: Characteristics, Controlling process.Management: Basic Concepts, Significance of Management for Business Enterprises; Comparison of Management with Similar Concepts; Development of Management Science: Classical, Behavioral, and Modern Theories; Management System: Fundamentals and Significance of Management System for Business Enterprises; Planning and Decision Making: Planning process ,Types of Plans; Organization: Fundamentals, Organization Process, Comparison of organization and planning processes; Authority and Power: Characteristics and Importance of Authority and Power, Delegation of Authority; Controlling: Characteristics, Controlling process.

işL116 (Eng) Fundamentals of Business 3+0 3.0

Business Environment; Business Ethics & Social Responsibility in Business; Business Ownership; Management Process: Planning, Organizing, Leading, Controlling; Organizational Design; Human Resources Management; Marketing Management; Marketing Mix: 4 P's of Marketing, 4 C's of Marketing; Management Information Systems; E-Business; Accounting: Financial Accounting, Cost Accounting; Financial Management: Financial Markets, Financial Institutions; International Business; Business Strategy.

işL201 Business Organization 3+0 4.0

Departmentalisation: Fundamentals and systems of departmentalisation; Authority: Definition and sources; Power: Definition and sources, Comparison of sources of authority and power; Delegation of Authority: Stages and principles; Centralization and Decentralization; Authority of Command and Staff Authority; Span of Management.Departmentalisation: Fundamentals and systems of departmentalisation; Authority: Definition and sources; Power: Definition and sources, Comparison of sources of authority and power; Delegation of Authority: Stages and principles; Centralization and Decentralization; Authority of Command and Staff Authority; Span of Management.

işL201 (Eng) Business Organization 3+0 4.0

Departmentalisation: Fundamentals and systems of departmentalisation; Authority: Definition and sources; Power: Definition and sources, Comparison of sources of authority and power; Delegation of Authority: Stages and principles; Centralization and Decentralization; Authority of Command and Staff Authority; Span of Management.Departmentalisation: Fundamentals and systems of departmentalisation; Authority: Definition and sources; Power: Definition and sources, Comparison of sources of authority and power; Delegation of Authority: Stages and principles; Centralization and Decentralization; Authority of Command and Staff Authority; Span of Management.

işL301 Human Resources Management 3+0 4.0

Human Resources Management: Development, Goals and Principles; Functions of Human Resources Management: Human resources planning; Recruitment, Performance Appraisal, Training, Orientation and Development; Wage and Salary Administration; Career Management; International Human Resources Management; Technology in Human Resources Management.Human Resources Management: Development, Goals and Principles; Functions of Human Resources Management: Human resources planning; Recruitment, Performance Appraisal, Training, Orientation and Development; Wage and Salary Administration; Career Management; International Human Resources Management; Technology in Human Resources Management.

işL301 (Eng) Human Resources Management 3+0 4.0

Human Resources Management: Development, Goals and Principles; Functions of Human Resources Management: Human resources planning; Recruitment, Performance Appraisal, Training, Orientation and Development; Wage and Salary Administration; Career Management; International Human Resources Management; Technology in Human Resources Management.Human Resources Management: Development, Goals and Principles; Functions of Human Resources Management: Human resources planning; Recruitment, Performance Appraisal, Training, Orientation and Development; Wage and Salary Administration; Career Management; International Human Resources Management; Technology in Human Resources Management.

işL302 (Eng) Production Management and Systems 3+0 4.5

Functions of Production: Definition, Inputs, Transformation process; Production Systems: Customized production, Mass Production Systems, Large-Batch Production; Product Design: Concept of design, Standardization, Leaning, Coding, Product-Based Process Design, Process-Based Design System, Production Chamber Process Design; Choosing of Technology: Expert Systems; Capacity Planing: Types of Capacity, Capacity Policies; Project Planning Models: Gantt Method CPM, PERT; Inventory Control Models; Production Planing Model.Functions of Production: Definition, Inputs,

Transformation process; Production Systems: Customized production, Mass Production Systems, Large-Batch Production; Product Design: Concept of design, Standardization, Leaning, Coding, Product-Based Process Design, Process-Based Design System, Production Chamber Process Design; Choosing of Technology: Expert Systems; Capacity Planing: Types of Capacity, Capacity Policies; Project Planning Models: Gantt Method CPM, PERT; Inventory Control Models; Production Planing Model.

işL321 Applied Entrepreneurship 3+1 5.0

Introduction to Entrepreneurship: Basic Concepts; Climate for Entrepreneurship: Economic Perspective: Opportunity Recognition and Idea Creating: Theory and practice; Feasibility Analysis; Industry and Competitive Analysis; Marketing Plan: Theory and practices; Operations Plan: Theory and practices; Management Plan: Theory and practices; Financial Plan: Theory and practices; Business Model Development; Financing and Funding for Entrepreneurial Business; Marketing Issues in Entrepreneurial Business; Franchising and Buying an Existing Business.

işL323 (Eng) Human Resources Management 3+0 5.0

Introduction: Importance of human as a resource, Importance of human resources management busines; Historical Development of Human Resources Management: Personel management, Human resource management, Strategic human resource management and Talent management; Human Resources Planning: Methods and Planning instruments; Job Analysis: Methods and process, Job descriptions and Job requirements; Functions of Human Resources Management: Recruitment, Finding and selecting, Placement, Orientation, Training and development, Performance appraisal, Wage and salary administration, Career management, Occupational health and safety, Industrial relations and discipline. Introduction: Importance of human as a resource, Importance of human resources management busines; Historical Development of Human Resources Management: Personel management, Human resource management, Strategic human resource management and Talent management; Human Resources Planning: Methods and Planning instruments; Job Analysis: Methods and process, Job descriptions and Job requirements; Functions of Human Resources Management: Recruitment, Finding and selecting, Placement, Orientation, Training and development, Performance appraisal, Wage and salary administration, Career management, Occupational health and safety, Industrial relations and discipline.

işL412 Strategic Management 2+0 3.0

Fundamental Principles of Strategic Management; Vision, Mission, Straegy, Politics: Strategic Management in Corporations: Definition of Strategic Management; Nature of Strategic Management; Fundamental Principles of Strategic Management; Strategic Management Processes; Development of Human Recources Between (1960-1990); Strategy; Process of Strategy, Purpose of Strategy; Analysis of External Environment; Corporate Analysis.

işL454 Management of Technology 3+0 4.5

Structures of Management Organizations; Organization of Project Groups; Project Management and Its Principles; Management Functions; Employee's Organization; Basic Principles in Project Management and Formation of Project Groups; Time Management; Project Planning; PERT Technique; GANTT Charts and Other Presentation Techniques; Pricing and Cost Control. Structures of Management Organizations; Organization of Project Groups; Project Management and Its Principles; Management Functions; Employee's Organization; Basic Principles in Project Management and Formation of Project Groups; Time Management; Project Planning; PERT Technique; GANTT Charts and Other Presentation Techniques; Pricing and Cost Control.

işL454 (Eng) Management of Technology 3+0 4.5

Structures of Management Organizations; Organization of Project Groups; Project Management and Its Principles; Management Functions; Employee's Organization; Basic Principles in Project Management and Formation of Project Groups; Time Management; Project Planning; PERT Technique; GANTT Charts and Other Presentation Techniques; Pricing and Cost Control. Structures of Management Organizations; Organization of Project Groups; Project Management and Its Principles; Management Functions; Employee's Organization; Basic Principles in Project Management and Formation of Project Groups; Time Management; Project Planning; PERT Technique; GANTT Charts and Other Presentation Techniques; Pricing and Cost Control.

işL475 Techno-Entrepreneurship 3+0 4.0

Techno-Entrepreneurship: Definitions, Concepts, History; Creativity and Innovation: Concepts, Innovation types, Situation in Turkey and world; Idea to Market: Emergence and commercialization process of business idea, road maps; Entrepreneurial Marketing: Concepts, strategy and implementation; Managerial Issues: Performance, Team work, Strategic orientations; Legal Issues: Patents, Copyrights, Law and regulations; Financial Issues: Sources of funding, Sponsorships; Characteristics of Techno-Entrepreneur: Background, Education, Personality; Sustainability and Innovator's Dilemma: Concepts, Reasons of failure; Future of Techno-Entrepreneurship: Trends.

iTA255 (ita) Italian I 3+0 4.0

Sounds in Italian; Masculine and Feminine Definite Articles; Personal and Demonstrative Pronouns; Use and Conjugation of Verbs 'Essere?' and 'Avere?'; Introducing Oneself; Improving Reading Comprehension by means of Dialogs ; Describing People ; Days ; Months ; Years ; Asking the Time ; Ordinal and Cardinal Numbers.

iTA256 (ita) Italian II 3+0 4.0

Simple and Compound Prepositions; Past Tense and Conjugation of Verbs in this Tense; Transitive and Intransitive Verbs in Past Tense; Improving Reading Skills; Analyzing Paragraphs and Texts; Interrogatives: Asking Questions; Introduction to Italian Culture and Daily Language.

JAP301 (Jap) Japanese I 4+0 4.0

Basic Verbs; Words and Sentence Structures Used In Daily Speech; Greetings; Meeting Someone new; Introducing Oneself; Asking For Price; Time Concept; Numbers; Verbs And Words About Traveling By Train And By Bus; Likes And Dislikes; Apologizing.

JAP302 (Jap) Japanese II 4+0 4.0

Introducing Oneself And One's Family; Ordering Food And Beverages In A Restaurant Or Cafe; Asking for the Bill; Meals And Expressions Used for Ordering Meals; Making A Reservation; Talking On The Phone; Asking For Information; Quantifiers; Demonstrative Adjectives; Talking About Past And Future.

JEO201 Engineering Geology 3+0 4.5

Principles of Geology; Structure of the Earth; Geological Cycles; Minerals and Rocks: Sedimentary, igneous and metamorphic; External Processes on Land and in Sea; Internal Processes: Including deformation of rocks; Earthquake areas in Turkey; Topics of Interest to Civil Engineering (Tunnel route evaluation; case studies); Introduction to Soil and Rock slope stability. Principles of Geology; Structure of the Earth; Geological Cycles; Minerals and Rocks: Sedimentary, igneous and metamorphic; External Processes on Land and in Sea; Internal Processes: Including deformation of rocks; Earthquake areas in Turkey; Topics of Interest to Civil Engineering (Tunnel route evaluation; case studies); Introduction to Soil and Rock slope stability.

JEO201 (Eng) Engineering Geology 3+0 4.5

Principles of Geology; Structure of the Earth; Geological Cycles; Minerals and Rocks: Sedimentary, igneous and metamorphic; External Processes on Land and in Sea; Internal Processes: Including deformation of rocks; Earthquake areas in Turkey; Topics of Interest to Civil Engineering (Tunnel route evaluation; case studies); Introduction to Soil and Rock slope stability. Principles of Geology; Structure of the Earth; Geological Cycles; Minerals and Rocks: Sedimentary, igneous and metamorphic; External Processes on Land and in Sea; Internal Processes: Including deformation of rocks; Earthquake areas in Turkey; Topics of Interest to Civil Engineering (Tunnel route evaluation; case studies); Introduction to Soil and Rock slope stability.

KiM113 General Chemistry 4+0 6.0

Matter: Elements, Compounds, Mixtures; Moles; Measurements and Units; Chemical Reactions; Reaction Stoichiometry; Structure of Atom; Chemical Bonds; molecules: Shape, Size, Bond strength; Properties of Gases; Gas Laws; Liquid and Solid Materials; Properties of Solutions; Acids and Bases; Water Solutions; Titrations; Buffer Solutions; Chemical Kinetics; Chemical Equilibrium; Thermodynamics; Electrochemistry.

KiM113 (Eng) General Chemistry 4+0 6.0

Matter: Elements, Compounds, Mixtures; Moles; Measurements and Units; Chemical Reactions; Reaction Stoichiometry; Structure of Atom; Chemical Bonds; molecules: Shape, Size, Bond strength; Properties of Gases; Gas Laws; Liquid and Solid Materials; Properties of Solutions; Acids and Bases; Water Solutions; Titrations; Buffer Solutions; Chemical Kinetics; Chemical Equilibrium; Thermodynamics; Electrochemistry.

KiM115 General Chemistry Laboratory 0+2 1.5

Basic Laboratory Operations; Formula of a Hydrate; Formula Mass of a Volatile Liquid; A KClO₃ Mixture and The Molar Volume of Oxygen; Formula Mass of a Solid; pH, Hydrolysis and Buffers; Vinegar Analysis; Aspirin Synthesis and Analysis; Qual 1. NH₄⁺, Ag⁺, Pb²⁺.

KiM115 (Eng) General Chemistry Laboratory 0+2 1.5

Basic Laboratory Operations; Formula of a Hydrate; Formula Mass of a Volatile Liquid; A KClO₃ Mixture and The Molar Volume of Oxygen; Formula Mass of a Solid; pH, Hydrolysis and Buffers; Vinegar Analysis; Aspirin Synthesis and Analysis; Qual 1. NH₄⁺, Ag⁺, Pb²⁺.

KiM117 (Eng) General Chemistry I 4+0 6.0

Matter: Elements, Compounds, Mixtures; Measurements and Mole Concept; Chemical Reactions Change of Matter; Reaction Stoichiometry-Chemical Calculations: Use of Reaction Stoichiometry; Properties of Gases, Law of Gases, Thermochemical Energy Heat and Enthalpy: Enthalpy of Chemical Change, Structure of Atoms: Model of Atoms;

Molecular Shape Chemical Bonds, Size and Bond force; Liquid and Solid Matters: Structure of Liquids; Structure of Solids; Material Based Carbon: Hydrocarbons, Polymers.

KiM118 (Eng) General Chemistry II 4+0 6.0

Solutions and Their Properties; Chemical Equilibrium: Defining Equilibrium Constant; Proton Transfer-Acids and Bases; Slat Solutions: Acidity and Basicity of Ions, Titrations, Buffer Solutions; Energy in the Conversion-Thermodynamic: First Law of The Thermodynamic; Electron Transfer-Electrochemistry: Galvanic Cells, Electrolyses; Kinetics-Reaction Rates: Concentration and Rate, Reaction Mechanisms; Main Group Elements I; Main Group Elements II; d-Block Transition Elements; Nuclear Chemistry: Radioactivity, Nuclear Energy.

KiM208 Organic Chemistry 3+0 4.0

Structure, Reactivity and Mechanism; Mechanisms of Electrophilic and Nucleophilic Substitution Reactions; Chemical Bonds; Alkanes; Alkenes; Alkynes; Nomenclature of Organic Compounds; Alcohols; Alkyl Halides; Ethers; Geometric and Stereo chemical Isomers; Aldehydes and Ketones; Carboxylic Acids; Esters; Acyl Halides; Amids; Concept of Aromaticity; Aromatic Substitutions; Aromatic Nitro Compounds; Phenols; Aromatic Aldehydes and Ketones; Aromatic Acids; Aromatic Amines. Structure, Reactivity and Mechanism; Mechanisms of Electrophilic and Nucleophilic Substitution Reactions; Chemical Bonds; Alkanes; Alkenes; Alkynes; Nomenclature of Organic Compounds; Alcohols; Alkyl Halides; Ethers; Geometric and Stereo chemical Isomers; Aldehydes and Ketones; Carboxylic Acids; Esters; Acyl Halides; Amids; Concept of Aromaticity; Aromatic Substitutions; Aromatic Nitro Compounds; Phenols; Aromatic Aldehydes and Ketones; Aromatic Acids; Aromatic Amines.

KiM208 (Eng) Organic Chemistry 3+0 4.0

Structure, Reactivity and Mechanism; Mechanisms of Electrophilic and Nucleophilic Substitution Reactions; Chemical Bonds; Alkanes; Alkenes; Alkynes; Nomenclature of Organic Compounds; Alcohols; Alkyl Halides; Ethers; Geometric and Stereo chemical Isomers; Aldehydes and Ketones; Carboxylic Acids; Esters; Acyl Halides; Amids; Concept of Aromaticity; Aromatic Substitutions; Aromatic Nitro Compounds; Phenols; Aromatic Aldehydes and Ketones; Aromatic Acids; Aromatic Amines. Structure, Reactivity and Mechanism; Mechanisms of Electrophilic and Nucleophilic Substitution Reactions; Chemical Bonds; Alkanes; Alkenes; Alkynes; Nomenclature of Organic Compounds; Alcohols; Alkyl Halides; Ethers; Geometric and Stereo chemical Isomers; Aldehydes and Ketones; Carboxylic Acids; Esters; Acyl Halides; Amids; Concept of Aromaticity; Aromatic Substitutions; Aromatic Nitro Compounds; Phenols; Aromatic Aldehydes and Ketones; Aromatic Acids; Aromatic Amines.

KiM211 Analytical Chemistry 3+0 3.0

Methods and Classification of Quantitative Analysis; Analytical Processes; Statistical Treatment of Analytical Data; Gravimetric Analysis Methods; Titrimetric Analysis Methods; Activity; Solubility; Acid-Base Equilibria in Water; pH, Polyfunctional acids and bases, Hydrolysis, Salts of polyfunctional acids, Buffer solutions; Neutralization Titration; Precipitation Titration; Compleximetric Titrations; Oxidation-Reduction Reactions; Application on Industrial Problems.

KiM211 (Eng) Analytical Chemistry 3+0 3.0

Methods and Classification of Quantitative Analysis; Analytical Processes; Statistical Treatment of Analytical Data; Gravimetric Analysis Methods; Titrimetric Analysis Methods; Activity; Solubility; Acid-Base Equilibria in Water; pH, Polyfunctional acids and bases, Hydrolysis, Salts of polyfunctional acids, Buffer solutions; Neutralization Titration; Precipitation Titration; Compleximetric Titrations; Oxidation-Reduction Reactions; Application on Industrial Problems.

KiM226 Physical Chemistry 3+0 4.0

Basic Concepts: Ideal gases and ideal gas mixtures; Kinetic Theory of Gases; Fundamental Laws of Thermodynamics and Related Equations; First, Second and Third Law of Thermodynamics; States of matter; Phase Equilibrium; Physical Properties of matter; Real Gases; Mixtures; General Properties of Mixtures; Ideal Mixtures; Non-Electrolyte Real Mixtures; Chemical Thermodynamics: Thermochemistry; Chemical Equilibrium; Electrochemistry; Electrical Concepts; Thermodynamics of Electrolyte Solutions; Electrolytic Conductivity; Ionic Equilibrium; Electrochemical Cells; Surface Chemistry and Colloids: Interfacial and Related Phenomena; Adsorption; Chemistry of Colloids.

KiM226 (Eng) Physical Chemistry 3+0 4.0

Basic Concepts: Ideal gases and ideal gas mixtures; Kinetic Theory of Gases; Fundamental Laws of Thermodynamics and Related Equations; First, Second and Third Law of Thermodynamics; States of matter; Phase Equilibrium; Physical Properties of matter; Real Gases; Mixtures; General Properties of Mixtures; Ideal Mixtures; Non-Electrolyte Real Mixtures; Chemical Thermodynamics: Thermochemistry; Chemical Equilibrium; Electrochemistry; Electrical Concepts; Thermodynamics of Electrolyte Solutions; Electrolytic Conductivity; Ionic Equilibrium; Electrochemical Cells; Surface Chemistry and Colloids: Interfacial and Related Phenomena; Adsorption; Chemistry of Colloids.

KiM230 Analytical Chemistry Laboratory 0+3 3.0

Gravimetric Method Applications; Determination of iron, Determination of sulphate; Titrimetric Method Applications; Acid-Base titrations, Determination of chloride by Mohr method, Determination of water hardness with EDTA; Spectroscopic Determination of Active Ingredients in Tablets; Determination of Ethyl Alcohol in Alcoholic Beverages by Gas Chromatography (GC); Determination of Lead in Brass by Atomic Absorption Spectroscopy; Infrared Determination of a Simple Organic Molecule.

KiM230 (Eng) Analytical Chemistry Laboratory 0+3 3.0

Gravimetric Method Applications; Determination of iron, Determination of sulphate; Titrimetric Method Applications; Acid-Base titrations, Determination of chloride by Mohr method, Determination of water hardness with EDTA; Spectroscopic Determination of Active Ingredients in Tablets; Determination of Ethyl Alcohol in Alcoholic Beverages by Gas Chromatography (GC); Determination of Lead in Brass by Atomic Absorption Spectroscopy; Infrared Determination of a Simple Organic Molecule.

KiM231 Physical Chemistry Laboratory 0+3 3.0

Determination of the Molecular Mass of a Liquid; Viscosity Measurements with the Falling Ball Viscometer; Determination of the Critical Quantities of a Real Gas; Freezing Point Depression; Determination of the Enthalpy of Combustion with a Calorimetric Bomb; Evaporative Equilibrium; Vapour Pressure of Mixtures of Ideal Fluids; Boiling Point Diagram of a Binary Mixture; Distribution Equilibrium; Determination of the Surface Tension of Pure Liquids with the Bubble Pressure Method; Conductivity of Strong and Weak Electrolytes; Electrogravimetric Determination of Copper.

KiM231 (Eng) Physical Chemistry Laboratory 0+3 3.0

Determination of the Molecular Mass of a Liquid; Viscosity Measurements with the Falling Ball Viscometer; Determination of the Critical Quantities of a Real Gas; Freezing Point Depression; Determination of the Enthalpy of Combustion with a Calorimetric Bomb; Evaporative Equilibrium; Vapour Pressure of Mixtures of Ideal Fluids; Boiling Point Diagram of a Binary Mixture; Distribution Equilibrium; Determination of the Surface Tension of Pure Liquids with the Bubble Pressure Method; Conductivity of Strong and Weak Electrolytes; Electrogravimetric Determination of Copper.

KiM282 Organic Chemistry Laboratory 0+3 3.0

Separation, Purification Methods: Filtration, Crystallization, Sublimation, Extraction, Distillation methods and applications; Chromatography Methods and Applications: Thin layer chromatography, Column chromatography; Nucleophilic Substitution Reactions; Elimination and Addition Reactions; Electrophilic Aromatic Substitution Reactions; Catalytic Hydrogenation Reactions; Esterification Reactions: Synthesis of soap, Synthesis of biodiesel from vegetable oil; Diazonium Salt Synthesis: Synthesis of dye pigment; Polymerization; Qualitative Organic Analysis: Solubility test, Functional group analysis.

KiM457 Chemical Technologies I 3+0 4.0

Introduction to Crushing and grinding, Crushing and grinding Techniques, Introduction to Ceramic Technology, Production Methods of Ceramics, Introduction to Cement Production Technology, Production Methods of Cement, Introduction to Iron-Steel-Aluminum Production Technology, Production Methods of Iron-Steel-Aluminums, Introduction to Glass Industries, Production Methods of Glasses, Methods of water purification Technology, Wastewater Treatment Methods, Methods of Fertilizer Production, Methods of Ammonia Production, Methods of Pulp and Paper Production, Sugar and Starch Industries and Production Methods.

KiM458 Chemical Technologies II 3+0 4.0

Introduction to Dyes and pigments industry, Types of Dyes and pigments and Production Methods, Introduction to Soap and Detergent Industry, Types of Soap and Detergents and Production Methods, Introduction to Corrosion industry, Types of Oil and Fats and Production Methods, Introduction to Milk and By-Product Industries, Types of Milk and By-Products and Production Methods, Introduction to Rubber-Plastic Industries, Types of Rubber-Plastics and Production Methods, Introduction to Acid Industries, Types of Acids and Production Methods, Fermentation Industries and Production Methods, Types of Industrial Gases and Production.

KMH105 (Eng) Technical English 2+0 2.5

The course reinforces academic writing, reading, translation and listening skills on the technical subjects. Report writing is emphasised and also audio-visual practices to improve the chemical engineering terminology involving vocabulary are made.

KMH108 (Eng) Introduction to Chemical Engineering 2+0 3.5

Description of Different Sample Processes; Fluid mechanics; Heat Transfer and Applications; Heat Exchangers; Evaporators; Mass Transfer and Applications; Phase Equilibrium in the Stage Separation Processes; Fractional Distillation; Solid-Liquid and Liquid-Liquid Extractions, Gas Absorption, Humidification; Drying of Solids; Operations Including Solid Particles; Chemical Reactions and Reactors.

- KMH210 Instrumental Analysis 3+0 3.0**
Interaction of Materials and Beam; Spectroscopy: Theory, Infrared spectroscopy, Ultraviolet and visible spectroscopy, Qualitative and quantitative applications, Atomic Absorption Spectroscopy, Nuclear Magnetic Resonance Spectroscopy; Chromatographic Methods: Theory, Paper Chromatography, Thin Layer Chromatography, Column Chromatography, Gas Chromatography (GC).
- KMH212 Computer Applications in Chemical Engineering 3+0 4.0**
The Fortran Programming; Use of Matlab; Using Numerical Computer Methods to Solve Chemical Engineering Problems; Introduction to Software Used in the Simulation and Design of Chemical Engineering Systems. The Fortran Programming; Use of Matlab; Using Numerical Computer Methods to Solve Chemical Engineering Problems; Introduction to Software Used in the Simulation and Design of Chemical Engineering Systems.
- KMH212 (Eng) Computer Applications in Chemical Engineering 3+0 4.0**
The Fortran Programming; Use of Matlab; Using Numerical Computer Methods to Solve Chemical Engineering Problems; Introduction to Software Used in the Simulation and Design of Chemical Engineering Systems. The Fortran Programming; Use of Matlab; Using Numerical Computer Methods to Solve Chemical Engineering Problems; Introduction to Software Used in the Simulation and Design of Chemical Engineering Systems.
- KMH213 (Eng) Chemical Process Calculations 3+2 6.0**
Material Balance: Recycle and bypass, Balances on reactive processes; Combustion reactions; Single-phase Systems: Ideal gases, Equations of state for non-ideal gases, Compressibility factor; Multicomponent gas-liquid systems; Energy Balances: Forms of energy, Kinetic and potential energy, Energy balances on closed and open systems, Balances on Non-reactive Processes: Elements of energy balance calculations, Effects of temperature and pressure on energy changes; Balances on Reactive Processes: Heats of reaction, Hess's law, Heats of formation and combustion, Fuels and combustion. Material Balance: Recycle and bypass, Balances on reactive processes; Combustion reactions; Single-phase Systems: Ideal gases, Equations of state for non-ideal gases, Compressibility factor; Multicomponent gas-liquid systems; Energy Balances: Forms of energy, Kinetic and potential energy, Energy balances on closed and open systems, Balances on Non-reactive Processes: Elements of energy balance calculations, Effects of temperature and pressure on energy changes; Balances on Reactive Processes: Heats of reaction, Hess's law, Heats of formation and combustion, Fuels and combustion.
- KMH303 Mathematical Modeling in Chemical Engineering 4+0 5.0 (Eng)**
Obtaining of Steady and Unsteady State Momentum, Mass and Energy Equations for Lumped and Distributed Systems Including Physical and Chemical Changes; Ordinary Differential Equations and Their Analytical Solutions; Laplace Transforms; Matrices; Series and Numerical Solutions of the Ordinary Differential Equations; Formulation of Partial Differential Equations and Their Solutions; Finite Differences
- KMH307 Experimental Design Techniques 3+0 4.0**
Introduction to Quality Engineering and Taguchi Method; Introduction to Experimental Design and Variance Analysis; Basic Statistics; Factorial and Partial Factorial Experiments; Introduction to Orthogonal Arrays: Definition, Two-three level standard orthogonal arrays, Interaction graphics; Modification of Orthogonal Arrays and Inner and Outer Orthogonal Arrays; Planning and Conducting Successful Experiments; Factors Affecting the Process; Methods Used For Detecting Controllable and Non-Controllable Factors; Taguchi Loss Functions; Signal/Noise Ratio; Dynamic Quality Characteristics.
- KMH307 Experimental Design Techniques 3+0 4.0 (Eng)**
Introduction to Quality Engineering and Taguchi Method; Introduction to Experimental Design and Variance Analysis; Basic Statistics; Factorial and Partial Factorial Experiments; Introduction to Orthogonal Arrays: Definition, Two-three level standard orthogonal arrays, Interaction graphics; Modification of Orthogonal Arrays and Inner and Outer Orthogonal Arrays; Planning and Conducting Successful Experiments; Factors Affecting the Process; Methods Used For Detecting Controllable and Non-Controllable Factors; Taguchi Loss Functions; Signal/Noise Ratio; Dynamic Quality Characteristics.
- KMH308 Mass Transfer 4+0 5.0**
Basic Principles of Mass Transfer: Molecular diffusion, Mass transfer coefficients, Phase equilibria; Gas-Liquid Operations: Distillation, Gas absorption, Humidification; Extraction; Leaching; Drying; Adsorption; Mass Transfer Applications and Design: Mc Cabe Thiele and enthalpy-concentration methods, Determination of plate spacing and ideal number of plates.
- KMH308 (Eng) Mass Transfer 4+0 5.0**
Basic Principles of Mass Transfer: Molecular diffusion, Mass transfer coefficients, Phase equilibria; Gas-Liquid Operations: Distillation, Gas absorption, Humidification; Extraction; Leaching; Drying; Adsorption; Mass Transfer Applications and Design: Mc Cabe Thiele and enthalpy-concentration methods, Determination of plate spacing and ideal number of plates.

KMH310 Heat Transfer 4+0 5.0
Basic Principles of Heat Transfer: Heat transfer conduction in solids, Principles of heat flow in fluids, Heat transfer without phase change, Radiation heat transfer; Heat transfer Applications: Double pipe heat exchangers, Design of shell and tube heat exchangers, Design of single and multi stage boilers.

KMH310 (Eng) Heat Transfer 4+0 5.0
Basic Principles of Heat Transfer: Heat transfer conduction in solids, Principles of heat flow in fluids, Heat transfer without phase change, Radiation heat transfer; Heat transfer Applications: Double pipe heat exchangers, Design of shell and tube heat exchangers, Design of single and multi stage boilers.

KMH313 Biorefinery Processes 3+0 4.0
Definition and Classification of Biorefinery, Triglyceride based biorefineries, Sugar and starch based biorefineries, Lignocellulose based biorefineries; Biological and chemical processes: Combustion and gasification, Liquefaction and pyrolysis, Biogas and biodiesel, Conversion of lignin and C5-C6 sugars to fine chemicals: Platform chemicals, homogenous and heterogeneous catalyst based conversion processes, Biological catalyst based conversion processes.

KMH314 (Eng) Chemical Reaction Engineering I 4+0 5.0
Fundamentals of Chemical Reaction Kinetics; Concept of Reaction Rate; Classification of Chemical Reactions; Kinetics of Homogeneous Reactions: Reaction mechanisms, Interpretation of constant-volume batch reactor data; Interpretation of variable-volume batch reactor data, Homogenous catalyst; Temperature and Reaction Rate; Heats of Reaction and Equilibrium; Introduction to Heterogeneous Reaction Kinetics: Fluid-fluid reactions, Fluid-particle reactions. Fundamentals of Chemical Reaction Kinetics; Concept of Reaction Rate; Classification of Chemical Reactions; Kinetics of Homogeneous Reactions: Reaction mechanisms, Interpretation of constant-volume batch reactor data; Interpretation of variable-volume batch reactor data, Homogenous catalyst; Temperature and Reaction Rate; Heats of Reaction and Equilibrium; Introduction to Heterogeneous Reaction Kinetics: Fluid-fluid reactions, Fluid-particle reactions.

KMH316 Biotechnology 3+0 4.0
(Eng)
Introduction to biotechnology: History, Principles; Microorganisms: Eukaryotes, Prokaryotes, Viruses; Cell Cultivation: Microbial, plant, animal cell cultures; Structure and Properties of Biomolecules; Genetic Engineering: Chromosome structure, DNA replication, Genomes, RNA and protein synthesis, Mutagenesis; Metabolic Pathways; Cell Growth Kinetics; Fermentation Techniques; Recovery and Purification of Products; Applications of Biotechnology; Biosafety and Ethics. Introduction to biotechnology: History, Principles; Microorganisms: Eukaryotes, Prokaryotes, Viruses; Cell Cultivation: Microbial, plant, animal cell cultures; Structure and Properties of Biomolecules; Genetic Engineering: Chromosome structure, DNA replication, Genomes, RNA and protein synthesis, Mutagenesis; Metabolic Pathways; Cell Growth Kinetics; Fermentation Techniques; Recovery and Purification of Products; Applications of Biotechnology; Biosafety and Ethics.

KMH317 Chemical Engineering Thermodynamics I 3+0 4.5
The Scope of Thermodynamics: Concepts of Force, Temperature, Pressure, Work, Energy and Heat; First Law of Thermodynamics: Internal energy, Energy balance for closed systems, State functions, Enthalpy, Mass and energy balances for open systems; Second Law of Thermodynamics: Heat engines, Carnot cycle, Entropy, Ideal work; Third Law of Thermodynamics; Thermodynamic Properties of Fluids: Property relations for homogeneous phases, Two-phase systems, Thermodynamic diagrams; Thermodynamics of Flow Systems; Production of Power from Heat; Refrigeration and Liquefaction: Carnot refrigerator, Heat pumps, Liquefaction processes.

KMH317 Chemical Engineering Thermodynamics I 3+0 4.5
(Eng)
The Scope of Thermodynamics: Concepts of Force, Temperature, Pressure, Work, Energy and Heat; First Law of Thermodynamics: Internal energy, Energy balance for closed systems, State functions, Enthalpy, Mass and energy balances for open systems; Second Law of Thermodynamics: Heat engines, Carnot cycle, Entropy, Ideal work; Third Law of Thermodynamics; Thermodynamic Properties of Fluids: Property relations for homogeneous phases, Two-phase systems, Thermodynamic diagrams; Thermodynamics of Flow Systems; Production of Power from Heat; Refrigeration and Liquefaction: Carnot refrigerator, Heat pumps, Liquefaction processes.

KMH318 Chemical Engineering Thermodynamics II 3+0 4.5
Thermodynamic Properties of Fluids: Property relations for homogeneous phases, Residual properties, Two-phase systems; Diagrams and Tables for Thermodynamic Properties; Solution Thermodynamics: Fundamental property relation, Chemical potential and phase equilibria, Partial properties, Fugacity; Applications of Solution Thermodynamics; Chemical Reaction Equilibria; Phase Equilibria: Equilibrium and stability, Vapor-liquid and Liquid-liquid equilibria, Vapor-liquid-liquid equilibrium, Solid-liquid and solid-vapor equilibria; Thermodynamic Analysis of Steady-State Flow Processes.

- KMH318** **Chemical Engineering Thermodynamics II (Kimya Mühendisliği Termodinamiği II)** **3+0 4.5**
(Eng)
- Thermodynamic Properties of Fluids: Property relations for homogeneous phases, Residual properties, Two-phase systems; Diagrams and Tables for Thermodynamic Properties; Solution Thermodynamics: Fundamental property relation, Chemical potential and phase equilibria, Partial properties, Fugacity; Applications of Solution Thermodynamics; Chemical Reaction Equilibria; Phase Equilibria: Equilibrium and stability, Vapor-liquid and Liquid-liquid equilibria, Vapor-liquid-liquid equilibrium, Solid-liquid and solid-vapor equilibria; Thermodynamic Analysis of Steady-State Flow Processes.
- KMH319** **Fundamentals of Polymer Chemistry** **3+0 4.0**
- Basic concepts and terms in polymer chemistry; Classification of polymers; Condensation polymerization reaction mechanism; Chain polymerization; Radical chain polymerization reaction mechanism; Ionic polymerization and coordination complex polymerization reaction mechanism; Controlled radical polymerization techniques; Copolymer types and synthesis; Modification reactions of polymers; Polymerization processes; Properties and characterization methods of polymers; Industrial polymers and their applications; Advanced technological applications of polymeric materials.
- KMH320** **Paint Technology** **3+0 4.0**
- Introduction to Paint Technology: Definition of paints and types of paints, Materials used in paint production, Paint components: Solvents, Paint components: Resins, Paint components: Pigments, paint components: Fillers, paint manufacturing process, Paint application systems, Equipments used in paint production, Paint quality control methods used in the industry, Analysis methods applied to paints.
- KMH323** **Biochemical Engineering Fundamentals** **3+0 4.0**
- Definition and importance of bioprocesses; Enzymes: Enzyme kinetics, Enzyme reactors, Immobilized enzymes, Industrial applications of enzymes; Cell cultivation and kinetics; Batch and continuous fermentation processes and industrial applications: Production of organic acids, ethyl alcohol; antibiotics and vitamins.
- KMH326** **Introduction to Pharmaceutical Technology** **3+0 4.0**
- Historical development of the pharmaceutical industry, Introduction to pharmaceutical technology, Definition and production of Pharmaceutical active ingredients, Definition and production of Pharmaceutical excipients, Biotechnological drug production, Tablet drug production, Liquid drug production, Cream and Gel drug production, stability of drug, Quality management in the pharmaceutical industry.
- KMH351** **Sugar Technology** **3+0 4.0**
- Sugar Beet Root Composition; Preparation: Storage, Cleaning, Sampling, Grading; Losses; Determination of Sugar Content; Production and Purification of Liqueur; Evaporation; Crystallization; Dehumidification; Molasses; Basic equipment and instrumentation.
- KMH352** **Water Technology** **3+0 4.0**
- Characteristics of Water: Physical Characteristics, Chemical characteristics; Physical Purification; Chemical Purification; Industrial Water Quality; Boiler Water Quality; Cooling Water Quality; Swimming Pool Water Quality; Irrigation Water Quality; Disinfection; Corrosion; Toxic Materials
- KMH353** **Air Pollution Removal Equipments** **3+0 4.0**
- The reasons of air pollution, Effects of Air pollutions: Effects on living and non-living creatures; Control of particulates: Precipitators, Centrifugal precipitators and electrostatical precipitators, Filters and varieties; Control of volatile organic components; Removal devices of sulfur dioxide and sulfur compounds and principals of operation; Removal devices of nitrogen oxides and principals of operation; Equipments that are added to motor vehicles and principals of operation.
- KMH354** **Boron Technology** **3+0 4.0**
- General information about inorganic boron compounds; Production technologies of inorganic boron compounds from boron ore: Sodium borates, Sodium 1-2 borates, Dehydration and drying of boraxes, Production of borax: Production of borax from tincal in Turkey, Dry borax production, Properties of boric acid and its usage: Production methods, Sulphuric acid and boric acid production from colemanite, Devices that are used for boric acid; General properties of sodium perborate and its usage; Boron compounds and biological properties of boron and its environmental waste problems.
- KMH355** **Food Chemistry** **3+0 4.0**
- Comprehensive evaluation of individual components of foods; Water; Amino acids and proteins, Lipids, Carbohydrates; Vitamins; Enzymes; Minerals and trace elements; Food additives; Their significance for food quality and safety.
- KMH356** **Bubble Column Technology** **3+0 4.0**
- Bubble column types : Operating states , gas distributors and operating states; Mass transfer and reactions; equipments for finding out absorption parameters, gas hold up and mass transfer coefficients: Flow regimes, bubble types, Calculations of

bubble diameters, Calculations of bubble rising velocity, Calculations of gas-liquid interface area, Calculations for three passes bubble columns.

KMH357 Electrochemistry 3+0 4.0
Electrochemical Terms and Concepts; Ionic conductivity; Electrolyte Equilibrium; Electrochemical cells; Fuel Cells: Electrochemical principles of fuel cells, Performance characterization of fuel cells; Electrolysis: Over potential, Decomposition potential; Accumulation of metals on cathode by electrolysis, Effect of concentration polarization on dissociation potential; Applications of electrolysis; Corrosion: Theory of electrochemical corrosion; Methods of Corrosion Protection: Cathode protection, Anodic protection, Inhibitors; Electrochemical Manufacturing Processes: Chlor-alkali industry, Metal production; Other inorganic electrolytic processes.

KMH357 Electrochemistry 3+0 4.0
(Eng)
Electrochemical Terms and Concepts; Ionic conductivity; Electrolyte Equilibrium; Electrochemical cells; Fuel Cells: Electrochemical principles of fuel cells, Performance characterization of fuel cells; Electrolysis: Over potential, Decomposition potential; Accumulation of metals on cathode by electrolysis, Effect of concentration polarization on dissociation potential; Applications of electrolysis; Corrosion: Theory of electrochemical corrosion; Methods of Corrosion Protection: Cathode protection, Anodic protection, Inhibitors; Electrochemical Manufacturing Processes: Chlor-alkali industry, Metal production; Other inorganic electrolytic processes.

KMH358 Measurement and Control in Chemical Processes 3+0 4.0
General Considerations in Measurement; Flow Measurement; Level Measurement; Temperature Measurement; Pressure Measurement; Density Measurement; Security and Miscellaneous Sensors; Control Theory, Selection of Control Valve and Sizing; Regulators and Final Control Element; Optimization and Control of Unit Operations in Chemical Processes

KMH358 Measurement and Control in Chemical Processes 3+0 4.0
(Eng)
General Considerations in Measurement; Flow Measurement; Level Measurement; Temperature Measurement; Pressure Measurement; Density Measurement; Security and Miscellaneous Sensors; Control Theory, Selection of Control Valve and Sizing; Regulators and Final Control Element; Optimization and Control of Unit Operations in Chemical Processes

KMH360 (Eng) Carbon Materials 3+0 4.0
The carbon element and its various forms: The element carbon, Carbon terminology, Carbon and organic chemistry; Old but new materials: Carbons; Graphite structure, its physical and chemical properties; Synthetic carbon and graphite: Carbonization and graphitization; Highly oriented graphite; Carbon fibers, Applications of carbon fibers; Porous carbons: Activated carbon and adsorption; Carbon foam; The fullerene molecules; Carbon nanotubes, Carbon nanotube applications. The carbon element and its various forms: The element carbon, Carbon terminology, Carbon and organic chemistry; Old but new materials: Carbons; Graphite structure, its physical and chemical properties; Synthetic carbon and graphite: Carbonization and graphitization; Highly oriented graphite; Carbon fibers, Applications of carbon fibers; Porous carbons: Activated carbon and adsorption; Carbon foam; The fullerene molecules; Carbon nanotubes, Carbon nanotube applications.

KMH406 (Eng) Separation Processes 3+0 5.0
Investigation of Separation Process based on the Physical Properties of Mixtures; Process Variables (Factors) in Separation Process; Phase Flows, Recycle Flows; Total Material Balance Equation in Whole Process; Component Material Balances; Phase Balances; Vapor-Liquid, Liquid-liquid and Solid-liquid Balance Ratios; Computer Software Use in Separation Process: Liquid-liquid extraction in constant equilibrium ratio system, Distillation in constant molar flow.

KMH407 Fuel and Energy Technologies 3+0 4.0
Energy; Energy Sources; Energy Conversion; Solid Fuels; Formation and Structure of Coal; Classification of Coal; Liquid and Gaseous Fuels; Physical Processing of Crude Petroleum; Natural Gas; Conversion Processes; Cracking; Reforming and Other Processes; Carbonization and Gasification Processes; Calorific Value: Tests on liquid fuels; Flue Gas Analysis; Calculations in Fuel and Energy.

KMH409 Oil Technology 3+0 4.0
Raw materials: Resources of animal fat, Resource of vegetable oil, Resource of mineral, Oil; Oil seeds: Storing, Cleaning, Conditioning, Sizing; Oil Recovery Methods: Mechanical pressing, Solvent extraction; Oil Refination: Removal of adhesive material; Removal of coloring material; Removal of odor, Removal of gums; ,Quality of Edible Oil; Applications of Waste Oil Processing.

KMH410 Coal Technologies 3+0 4.0

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.

KMH411 Polymer Technology 3+0 4.0

Polymer and Polymer Terms; Types of Polymer and Polymerization Reactions; Structure of Polymers, Molecular Weight and Distribution; Polymeric Solutions and Gel Forms; Morphology, Rheology and Basic Properties of Polymers; Reactors for Polymers and Chemical Reactions of Polymers; Handling of Polymers; Analysis and Test Methods of Polymers; Industrial Applications of Polymers.

KMH412 Petroleum Refinery Engineering 3+0 4.0

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.

KMH415 Process Dynamics and Control 4+0 5.0

Definition of Process Control and Its Content; The Laplace Transforms; Linear Open-Loop Systems: Modeling of the First Order Systems, Transfer functions and Dynamic Behaviors; Dynamic behaviors of the First Order Systems in Series; Second Order Systems and Transportation Lag, Linear Closed-Loop Systems: Control System, Controllers and Final Control Elements; Dynamic Behavior of a Basic Control System; Stability; Root Locus; Design of Feedback Controller; Frequency Response Analyze: Nyquist and Bode Diagrams; Design of a Control System via Frequency Response.

KMH415 (Eng) Process Dynamics and Control 4+0 5.0

Definition of Process Control and Its Content; The Laplace Transforms; Linear Open-Loop Systems: Modeling of the First Order Systems, Transfer functions and Dynamic Behaviors; Dynamic behaviors of the First Order Systems in Series; Second Order Systems and Transportation Lag, Linear Closed-Loop Systems: Control System, Controllers and Final Control Elements; Dynamic Behavior of a Basic Control System; Stability; Root Locus; Design of Feedback Controller; Frequency Response Analyze: Nyquist and Bode Diagrams; Design of a Control System via Frequency Response.

KMH425 (Eng) Chemical Reaction Engineering II 4+0 5.0

Material and Energy Balances for Reactors; Design for Ideal Reactors: Batch reactors, Continuous stirred tank reactors, Plug-flow reactors, Ideal reactors connected in series/parallel; Design for Multiple Reactions and Product Distribution; Autocatalytic Reactions and Recycle Reactor; Temperature and Pressure Effects; Introduction to Heterogeneous Reactor Design: Design for fluid-fluid reactions, Design for fluid-particle reactions. Material and Energy Balances for Reactors; Design for Ideal Reactors: Batch reactors, Continuous stirred tank reactors, Plug-flow reactors, Ideal reactors connected in series/parallel; Design for Multiple Reactions and Product Distribution; Autocatalytic Reactions and Recycle Reactor; Temperature and Pressure Effects; Introduction to Heterogeneous Reactor Design: Design for fluid-fluid reactions, Design for fluid-particle reactions.

KMH429 Special Topics in Chemical Engineering 1+2 3.0

Mass and heat transfer, separation processes, chemical kinetics, thermodynamics, chemical process calculations, process control; Chemical technologies such as coal, petroleum, biomass, oil, food and natural products, cement, paper, drug, fertilizer and environment.

KMH429 (Eng) Special Topics in Chemical Engineering 1+2 3.0

Mass and heat transfer, separation processes, chemical kinetics, thermodynamics, chemical process calculations, process control; Chemical technologies such as coal, petroleum, biomass, oil, food and natural products, cement, paper, drug, fertilizer and environment.

KMH431 (Eng) Chemical Engineering Design I 4+0 6.0

Process Evaluation: Mass and heat balances; Flow Sheets; Process Plant Design: Cost estimation and optimization; Design Information and Data; Materials of Construction; Piping and Instrumentation; Safety and Loss Prevention; Plant Location and Site Selection; Plant Layout; Environmental Considerations. Process Evaluation: Mass and heat balances; Flow Sheets; Process Plant Design: Cost estimation and optimization; Design Information and Data; Materials of Construction; Piping and Instrumentation; Safety and Loss Prevention; Plant Location and Site Selection; Plant Layout; Environmental Considerations.

KMH432 (Eng) Chemical Engineering Design II 4+0 6.0

Selection of Main and Ancillary Equipment, Specification and Design; Heat Exchange Equipment; Towers; Packed Towers; Sieve and Valve Tray Design; Mechanical Design of Process Equipment; Scale-up of Process Equipment; Software Applications Used in the Simulation and Design of Chemical Engineering Systems. Selection of Main and Ancillary Equipment, Specification and Design; Heat Exchange Equipment; Towers; Packed Towers; Sieve and Valve Tray Design; Mechanical Design of Process Equipment; Scale-up of Process Equipment; Software Applications Used in the Simulation and Design of Chemical Engineering Systems.

KMH433 Industrial Equipments in Chemical Engineering 3+0 4.0

Basic concepts of Chemical Engineering; Chemical Reactions and Chemical Reactors; Fluid Mechanics Equipments: Manometers, Pressure indicators, Fluid flow measurement elements, Valves, Fluid mover equipments; Heat Transfer Equipments: Heat exchangers, Boilers, Evaporators; Mass Transfer Equipments: Distillation Columns, Extractors, Absorbers, Cooling towers, Drier-dehumidifiers, Adsorbers; Equipment within the scope of thermodynamics: Nozzles, Diffusers, Compressors, Fans, Sprayers; Thermal conversion and power conversion equipments; Solid particle processing equipment; Investment cost analysis.

KMH434 Chemical Engineering Applications 2+4 7.0

Synthesis of theoretical and practical engineering knowledge; literature review; research techniques in chemical engineering.

KMH434 (Eng) Chemical Engineering Applications 2+4 7.0

Synthesis of theoretical and practical engineering knowledge; literature review; research techniques in chemical engineering.

KMH435 Chemical Engineering Laboratory I 0+4 5.0

Tubular and Plate Heat Exchangers Experiment; Gas Phase Diffusion Coefficient Experiment; Liquid Phase Diffusion Experiment; Temperature Measurement and Calibration Experiment; Batch Reactor Experiment; Measurement of Fluid Friction (Osbourne-Reynolds) Experiment, Fixed and Fluidized Bed Experiment; Measurement of Viscosity Experiment; Ion Exchange Experiment; Heat Transfer from Radial and Linear Surfaces Experiment.

KMH435 (Eng) Chemical Engineering Laboratory I 0+4 5.0

Tubular and Plate Heat Exchangers Experiment; Gas Phase Diffusion Coefficient Experiment; Liquid Phase Diffusion Experiment; Temperature Measurement and Calibration Experiment; Batch Reactor Experiment; Measurement of Fluid Friction (Osbourne-Reynolds) Experiment, Fixed and Fluidized Bed Experiment; Measurement of Viscosity Experiment; Ion Exchange Experiment; Heat Transfer from Radial and Linear Surfaces Experiment.

KMH436 Chemical Engineering Laboratory II 0+4 5.0

Tubular and Continuous Stirred Tank Reactor Experiment; Gas Absorption Experiment; Distillation Experiment; Evaporator Experiment; Extraction Experiment; Process Control Experiment; Petroleum Distillation Experiment; Shell and Tube Heat Exchanger and Jacketed Vessel Experiment; Unsteady State Heat Transfer Experiment; Extended Surface Heat Transfer and Radiant Heat Transfer Experiment.

KMH436 (Eng) Chemical Engineering Laboratory II 0+4 5.0

Tubular and Continuous Stirred Tank Reactor Experiment; Gas Absorption Experiment; Distillation Experiment; Evaporator Experiment; Extraction Experiment; Process Control Experiment; Petroleum Distillation Experiment; Shell and Tube Heat Exchanger and Jacketed Vessel Experiment; Unsteady State Heat Transfer Experiment; Extended Surface Heat Transfer and Radiant Heat Transfer Experiment.

KMH437 (Eng) Alcohol Based Fuels 3+0 4.0

Introduction: Global energy problem; Alcohol-based Fuels: Production of alcohols; Production of Methanol from Biomass: Process technology; Production of Ethanol from Corn: Industrial production process; Production of Methanol from Landfill-Gas: Production of methanol from landfill gas; Domestic uses of methanol; Production of Butanol from Corn: Biochemistry of butanol production; Process economy; Ethanol-Based Fuels: Ethanol-based fuels and their uses; Production of Hydrogen from Methanol: Catalytic steam reforming process; Production of Hydrogen from Ethanol: Catalytic ethanol reforming; Alcohol Based Bio-Fuel Cells with Enzyme Electrodes. Introduction: Global energy problem; Alcohol-based Fuels: Production of alcohols; Production of Methanol from Biomass: Process technology; Production of Ethanol from Corn: Industrial production process; Production of Methanol from Landfill-Gas: Production of methanol from landfill gas; Domestic uses of methanol; Production of Butanol from Corn: Biochemistry of butanol production; Process economy; Ethanol-Based Fuels: Ethanol-based fuels and their uses; Production of Hydrogen from Methanol: Catalytic steam reforming process; Production of Hydrogen from Ethanol: Catalytic ethanol reforming; Alcohol Based Bio-Fuel Cells with Enzyme Electrodes.

KMH438 (Eng) Computer Aided Design in Chemical Engineering 3+0 4.0

Preparation of flow sheet; Mixer and splitter simulation; Simulation of vapor-liquid equilibrium of binary mixtures; Heat exchanger simulation; Batch reactor simulation; Continuous stirred tank reactor (CSTR) simulation; Plug flow reactor (PFR) simulation; Gas absorber simulation; Extraction simulation; Recycle module simulation; Simulation of a simple chemical process: Selection of a chemical process and definitions of main items; Design of the process as a whole.

KMH439 (Eng) Catalytic Materials 3+0 4.0

Introduction: The phenomenon catalysis, Action of catalysts; Classification of catalysts; Comparison of homogeneous and heterogeneous catalysis; Heterogeneous catalyst materials, properties and preparation: Physical, chemical and dynamic properties of catalysts; Preparation of catalyst supports; Deposition of the active components onto a support; Principles and objectives of catalyst characterization: Determining properties of catalysts; Solid Catalyzed Reaction: Steps in a heterogeneous catalytic reaction; Adsorption and desorption; Reaction and diffusion resistances for a catalytic reaction; Kinetics of catalytic surface reactions; Catalyst deactivation.

KMH440 (Eng) Polymer Materials Science 3+0 4.0

Introductory concepts and definitions of polymers; Chemical structure of polymers; Chemical structure and properties of polymers; Tests applied to polymers; Optical properties of polymers; Mechanical properties of polymers; Electrical properties of polymers; Thermal properties of polymers; Solubility and chemical stability of polymers; Polymer processing; Polymer composites; Applications of polymer composites. Introductory concepts and definitions of polymers; Chemical structure of polymers; Chemical structure and properties of polymers; Tests applied to polymers; Optical properties of polymers; Mechanical properties of polymers; Electrical properties of polymers; Thermal properties of polymers; Solubility and chemical stability of polymers; Polymer processing; Polymer composites; Applications of polymer composites.

KMH441 (Eng) Catalysis 3+0 4.0

General characteristics of catalysts; Classification and preparation methods; Principles and mechanisms of catalysis; Kinetics of fluid-solid catalytic reactions; Internal and external diffusion; Adsorption, surface reaction and desorption; Reactor design for heterogeneous catalytic reaction; Deactivation of catalysts.

KMH442 (Eng) Textile Chemical Processing 3+0 4.0

Overview of textile processing: from fibres to fabrics; Classification of textile fibres: natural fibres, chemical fibres, fundamentals of fabric structures; Overview and classification of textile finishing processes; Pre-treatment (preparatory) processes; Textile dyeing: dyeing equilibria and kinetics; Classification of textile dyes; Textile dyeing/chemical application methods; Dyeing of cellulosic fibres; Dyeing of wool; Dyeing of synthetic fibres; Chemical Finishing of Textiles: Concentration relationships; Functional finishes for improving comfort properties.

KMH451 Phase Equilibrium 3+0 4.0

The Phase Rule and Duhem's Theorem; Thermodynamic Properties of Real Matters; Stability and Equilibrium Equations in Single Component Systems; State Function; Phase Equilibrium of Pure Fluids; Vapor Pressure; Multiphase System; Multicomponent System; Nature and Criteria of Phase Equilibrium; Multiphase System; Models of Activity Coefficients; Phase Equilibrium in Mixtures; Gas-Liquid and Liquid-Liquid Vapor Equilibrium; Supercritical Fluids; Distribution Coefficient.

KMH452 Food Processing 3+0 4.0

Basic methods of food preservation. Physical and chemical characteristics of Food; Industrial Processing: Dehydration, Freezing, Canning, Fermentation, Irradiation, Chemicals; Storage and Transportation.

KMH453 Operations of Solid Particles 3+0 4.0

Properties and Handling of Particulate Solids; Size Reduction Equipment; Mixing of Solids and Pastes; Mechanical Separations; Screening, Screening Equipment, Separation through Fluids: Gravity Settling, Centrifugal Settling; Filtration: Principles of Filtration and Clarification.

KMH454 Heat Transfer Equipments 3+0 4.0

Heat Exchangers: Types of Heat Exchangers; Condensers; Boilers; Extended Surface Equipment; Scraped Surface Exchangers; Evaporators: Types of Evaporators

KMH455 Food Additives 3+0 4.0

Definitions of Food Additives; Antioxidants; Emulsifying Agents; Gums; Food Preservatives; Flavourings; Flavour Enhancers; Coloring Agents; Chelat Agents; Sweeteners Anticoagulants; Flour Additives

KMH456 Occupational Health and Safety 3+0 4.0

Mortality and Serious Injury in the Workplace; Prevention of Accidents: Workers Compensation for Risky Working Environments; Magnetic Fields; Cancer and Other Effects; Diseases Caused by Organic Dusts; Vibration and Noise; Industrial Hygiene; Characteristics of Some Toxic Materials and Their Effects: Properties of Some Hazardous Organic

Compounds, Organic Solvent Neurotoxicity; Characteristics and Classification of Explosives: Exposure assessments for Risk Control; Occupational Health and Safety Regulations. Quality Assurance in Occupational Health Services; Promoting Safe Behaviour. Preparation of MSDS Forms: Emergency and First-Aid Applications.

KMH457 (Eng) Transport Phenomena **3+0 4.0**
Momentum Transfer: Mechanism of viscosity and momentum transfer, Velocity distribution in laminar flow, Equation of continuity, Equation of motion; Energy Transfer: Mechanism of heat conductivity and energy transfer, Temperature distribution in solid and laminar flow, Equation of change in nonisothermal systems; Mass Transfer: Mechanism of diffusivity and mass transfer, Concentration distribution in solid and laminar flow, Equations of change at multicomponent systems

KMH458 Chemical Process Optimization **3+0 4.0**
Problem Formulation: The Nature and Organization of Optimization Problems; Fitting Models to Data; Formulation of Objective Functions; Optimization Theory and Methods: Basic Concepts of Optimization; Optimization of Unconstrained Functions-One Dimensional Search; Unconstrained Multivariable Optimization; Linear Programming and Applications; Nonlinear Programming with Constrains; Optimization of Staged and Discrete Processes; Application of Optimization to the Chemical Engineering Processes.

KMH458 Chemical Process Optimization **3+0 4.0**
(Eng)
Problem Formulation: The Nature and Organization of Optimization Problems; Fitting Models to Data; Formulation of Objective Functions; Optimization Theory and Methods: Basic Concepts of Optimization; Optimization of Unconstrained Functions-One Dimensional Search; Unconstrained Multivariable Optimization; Linear Programming and Applications; Nonlinear Programming with Constrains; Optimization of Staged and Discrete Processes; Application of Optimization to the Chemical Engineering Processes.

KMH459 (Eng) Geopolymer Production and Applications **3+0 4.0**
Introduction to Geopolymers; Raw Materials for Geopolymers; Macromolecular Structure of Geopolymers; Geopolymer synthesis; Characterization Techniques of Geopolymers; Physical Properties of Geopolymers; Chemical Properties of Geopolymers; Applications of Geopolymers: Geopolymer cement production, geopolymer concrete production, Foam production, Block production, Adsorption.

KMH460 Membrane Separation Processes **3+0 4.0**
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.

KMH462 (Eng) Membrane Science and Technology **3+0 4.0**
Introduction to Membrane Processes: Driving forces in membranes, Flow configuration, Types of membrane processes, Membrane transport mechanism; Membrane Materials and Material Properties; Preparation Techniques for Membranes; Characterization Techniques for Membranes; Pressure Driven Membrane Processes; Concentration Driven Membrane Processes; Thermally Driven Membrane Processes; Electrically Driven Membrane Processes; Membrane Reactors; Applications of Membrane Technology.

KMH464 Chemical Admixtures for Concrete Production **3+0 4.0**

KÜL451 History of Science and Engineering **3+0 4.5**
Science and Technology in Ancient Age: Mesopotamia, Ancient Egypt, Ancient Greece and Rome, Ancient Anatolia, Ancient Chinese and Central Asian Civilizations; Science and Technology in Middle Age: Medieval Europe; Islamic World; Renaissance and Modern Science; Enlightenment Age, Industrial Revolution; Technologic Development: Steam Engine, Internal Combustion Engine, Usage of Electricity, Conversion of Electrical Energy to Mechanical Energy, Telegraph and Telephones, Wireless Communication, Radio, Television, Space Travel, Vacuum Lamp Technology, Invention of Transistor and Silicon Age, Development of Computer Technology; Information Age. Science and Technology in Ancient Age: Mesopotamia, Ancient Egypt, Ancient Greece and Rome, Ancient Anatolia, Ancient Chinese and Central Asian Civilizations; Science and Technology in Middle Age: Medieval Europe; Islamic World; Renaissance and Modern Science; Enlightenment Age, Industrial Revolution; Technologic Development: Steam Engine, Internal Combustion Engine, Usage of Electricity, Conversion of Electrical Energy to Mechanical Energy, Telegraph and Telephones, Wireless Communication, Radio, Television, Space Travel, Vacuum Lamp Technology, Invention of Transistor and Silicon Age, Development of Computer Technology; Information Age.

KÜL451 (Eng) History of Science and Engineering **3+0 4.5**

Preliminaries: Binary operations and algebraic structures; Matrices and Systems of Linear Equations: Matrices, Arithmetics of matrices, Systems of linear equations and their solutions by matrices; Determinants and their Applications; Vector Spaces: Vectors in plane and in 3-space, Vector spaces and subspaces, Linear dependence, Linear independence and base; Inner Product Spaces; Linear Transformations; Eigenvalues and Eigenvectors: Diagonalization, Symmetric and Hermitian transformations, Quadratic forms.

MAT293 (Eng) Engineering Mathematics and Statistics 4+0 7.0

Multivariable Calculus: Rotation of coordinate axes, Scalar or dot product, Vector or cross product, Gradients, Divergence of vector field, Curl of a vector field, Vector Integration, Line integrals Multiple integrals, Arc length, Surface area, Volume calculation, Cylindrical coordinates, Spherical coordinates, Gauss' Theorem, Stokes' Theorem; Complex Calculus, Complex algebra, Cauchy-Riemann conditions, Cauchy's integral theorem, Singularities, Calculus of residue, Mapping, Conformal Mapping; Data Representation, Introduction to Probability Theory, Random Sampling, Point Estimation of Parameters, Confidence Intervals, Testing of Hypotheses (Decisions), Goodness of Fit, Nonparametric Tests, Regression, Fitting Straight Lines, Correlation

MAT410 Game Theory 3+0 5.0

Examples of Games; Game Theory Notions; Two-Person Zero-Sum Games, Mixed strategies, Minmax (von Neumann) theorem, Equilibrium strategies, Solution of (nxm) games; Two-Person Non-Zero-Sum games, Nash theorem, Equilibrium strategies, Solution methods; Cooperative games; N-Person Games, Stable Sets, Non-Cooperative Games, Shapley value; Market Games and Oligopoly, M-N Market Game, Duopoly, Cournot equilibrium, Metagames.

MAT805 Calculus I 4+2 7.5

Introduction to calculus, limits and continuity, Differentiation and taking derivatives, Transcendental and inverse functions, Complex numbers, Applications of derivatives, Integration, Integral techniques, Applications of integrals. Introduction to calculus, limits and continuity, Differentiation and taking derivatives, Transcendental and inverse functions, Complex numbers, Applications of derivatives, Integration, Integral techniques, Applications of integrals.

MAT805 (Eng) Calculus I 4+2 7.5

Introduction to calculus, limits and continuity, Differentiation and taking derivatives, Transcendental and inverse functions, Complex numbers, Applications of derivatives, Integration, Integral techniques, Applications of integrals. Introduction to calculus, limits and continuity, Differentiation and taking derivatives, Transcendental and inverse functions, Complex numbers, Applications of derivatives, Integration, Integral techniques, Applications of integrals.

MAT806 Calculus II 4+2 7.5

Conics, Parametric and polar curves, Sequences, Series, Power series, Vectors, Vector functions and curves, Partial differentiation, Partial differentiation applications, Multiple integrals, Vector fields, Vector calculus. Conics, Parametric and polar curves, Sequences, Series, Power series, Vectors, Vector functions and curves, Partial differentiation, Partial differentiation applications, Multiple integrals, Vector fields, Vector calculus.

MAT806 (Eng) Calculus II 4+2 7.5

Conics, Parametric and polar curves, Sequences, Series, Power series, Vectors, Vector functions and curves, Partial differentiation, Partial differentiation applications, Multiple integrals, Vector fields, Vector calculus. Conics, Parametric and polar curves, Sequences, Series, Power series, Vectors, Vector functions and curves, Partial differentiation, Partial differentiation applications, Multiple integrals, Vector fields, Vector calculus.

MEK201 (Eng) Statics 3+0 5.0

Definition of the Mechanics and Introduction; Static of Particles: Principles and the problems; Force Systems in a Plane; Static of Rigid Bodies: Equivalent systems, Equilibrium of rigid bodies; Trusses; Method of joints, Method of sections; Space Force System; Distributed Loads; Centre of Gravity; Analysis of Structures; Forces in Beams and Cables; Distributed Loads: Moment of inertia; method of Virtual Work; Friction. Definition of the Mechanics and Introduction; Static of Particles: Principles and the problems; Force Systems in a Plane; Static of Rigid Bodies: Equivalent systems, Equilibrium of rigid bodies; Trusses; Method of joints, Method of sections; Space Force System; Distributed Loads; Centre of Gravity; Analysis of Structures; Forces in Beams and Cables; Distributed Loads: Moment of inertia; method of Virtual Work; Friction.

MEK206 (Eng) Dynamics 3+0 4.5

Definition and Introduction; Kinematics of a Particle; Kinetics of a Particle: Newton's second law, Impulse and momentum; Work-Force Area; Potential and Kinetic Energy; Vibration; System of Particles; Motion of Particles with Variable Mass; Kinetics of a Rigid Body; Euler Angles; Centre of Gravity Theorems; Eccentric Rotation and Plane Motion; Relative

Motion. Definition and Introduction; Kinematics of a Particle; Kinetics of a Particle: Newton's second law, Impulse and momentum; Work-Force Area; Potential and Kinetic Energy; Vibration; System of Particles; Motion of Particles with Variable Mass; Kinetics of a Rigid Body; Euler Angles; Centre of Gravity Theorems; Eccentric Rotation and Plane Motion; Relative Motion.

MEK212 (Eng) Strength of Materials I 3+2 6.0

General Definitions and Principles of Mechanics; Definition of Stress and Strain; Mechanical Properties of Materials; Linear Elasticity and Hook's Law; Statically Indeterminate Structures under Axial Load; Torsion: General Torsion Formulas for Circular Cross-Sections, Statically Indeterminate Systems under Torque; Bending: Internal Force Diagrams, Bending Stresses, Composite Cross-Sections; Transverse Shear; Stress and Strain Transformation: General Principles of Transformation, Use of Mohr Circle; Combined Loading of Axial Load Moment, Shear and Torsion; Elastic Curve of Beams. General Definitions and Principles of Mechanics; Definition of Stress and Strain; Mechanical Properties of Materials; Linear Elasticity and Hook's Law; Statically Indeterminate Structures under Axial Load; Torsion: General Torsion Formulas for Circular Cross-Sections, Statically Indeterminate Systems under Torque; Bending: Internal Force Diagrams, Bending Stresses, Composite Cross-Sections; Transverse Shear; Stress and Strain Transformation: General Principles of Transformation, Use of Mohr Circle; Combined Loading of Axial Load Moment, Shear and Torsion; Elastic Curve of Beams.

MEK215 (Eng) Statics and Strength of Materials 3+0 4.5

Introduction to the General Principles of Mechanics: Idealizations, Units, Significant Figures, Newton's Laws; Force Vectors and Force System Resultants; Equilibrium of Particles and Rigid bodies; Structural Analysis; Method of Sections; Method of Joints; Frames and Machines; Internal Forces; Shear and Moment Diagrams; Concepts of Stress and Strain; Axial Loading and Deformation; Thermal Stresses; Factor of Safety. Introduction to the General Principles of Mechanics: Idealizations, Units, Significant Figures, Newton's Laws; Force Vectors and Force System Resultants; Equilibrium of Particles and Rigid bodies; Structural Analysis; Method of Sections; Method of Joints; Frames and Machines; Internal Forces; Shear and Moment Diagrams; Concepts of Stress and Strain; Axial Loading and Deformation; Thermal Stresses; Factor of Safety.

MEK216 (Eng) Engineering Mechanics: Dynamics 3+0 4.0

Newton's Laws of Motion; Unit systems, Kinetics of particles, Applying the laws of motion to Cartesian, Cylindrical and spherical coordinates, Definitions of force-mass-momentum, Work and energy, Function of forces and potential energy, Impulse-momentum, Collision, Kinematics of rigid bodies, rotation around a fixed axis and general planar motion, Mechanical vibrations, Practice and problem solutions.

MEK217 (Eng) Engineering Mechanics: Statics 3+0 5.0

Vector Algebra; Forces and Moments; Equivalent Force Systems in Rigid Bodies; Free Body Diagram; Equilibrium; Center of Gravity; Distributed Forces; Introduction to Structural Mechanics; Planar Truss Systems; Frames and Machines; Internal Forces in Structural Members; Joint Points and Cutting Method; Shear and Bending Moment Diagrams; Moment of Inertia; Friction; Principle of Virtual Work.

MEK307 Fluid Mechanics 3+0 4.5

Fundamental Concepts: Pressure, Liquids with Different inherent weight and liquids in relative balance, Static of fluids, Kinematics of fluids; Fundamental Equations of One-Dimension Flows: Continuity equation and Bernoulli equation; Theorem of Impulse-Momentum; One Dimension Flows of Ideal Fluids; One Dimension Flows of Real Fluids; Two-Dimension Flows of Ideal Fluids; Two-Dimension Flows of Real Fluids; Uniform Flow in Open Channels; Gradually Varied Flow in Open Channels.

MEK307 (Eng) Fluid Mechanics 3+0 4.5

Fundamental Concepts: Pressure, Liquids with Different inherent weight and liquids in relative balance, Static of fluids, Kinematics of fluids; Fundamental Equations of One-Dimension Flows: Continuity equation and Bernoulli equation; Theorem of Impulse-Momentum; One Dimension Flows of Ideal Fluids; One Dimension Flows of Real Fluids; Two-Dimension Flows of Ideal Fluids; Two-Dimension Flows of Real Fluids; Uniform Flow in Open Channels; Gradually Varied Flow in Open Channels.

MEK311 (Eng) Strength of Materials 4+0 6.0

Introduction and Basic Concepts; Stress; Strain; Relations between Stress and Deformation (Hooke Law); Yielding and Failure Criteria; Mohr's Circle; Area Moments; Axial Loading; Torsional Stress; Simple Bending and Biaxial Bending; Torsion; Shear Force and Bending Moment Diagrams; Stress in Beams; Deflection in Beams and Elastic Curves; Hypotheses for Failure.

MEK315 Fluid Mechanics 3+2 6.0

Basic Concepts: Unit systems, Mechanical energy balance; Fluid Mechanics: Fluid static and its applications; Basic Equations of Fluid Flow; Flow of Incompressible Fluids in Conduits and Thin Layers; Flow of Compressible Fluids; Flow of Fluids Through Fixed Beds; Transportation of Fluids and measuring Flow Speed; Agitation and Mixing of Liquids. Basic

Concepts: Unit systems, Mechanical energy balance; Fluid Mechanics: Fluid static and its applications; Basic Equations of Fluid Flow; Flow of Incompressible Fluids in Conduits and Thin Layers; Flow of Compressible Fluids; Flow of Fluids Through Fixed Beds; Transportation of Fluids and measuring Flow Speed; Agitation and Mixing of Liquids.

MEK317 Fluid Mechanics 4+0 5.0

Basic Concepts: Unit Systems, Mechanical energy balances; Fluid mechanics: Fluid static and its applications; Basic Equations of Fluid Flow; Flow of Incompressible Fluids in Conduits and Thin Layers; Flow of compressible Fluids; Flow of Fluids Through Fixed Beds; Transportation of Fluids and measuring Flow Speed; Agitation and mixing of Liquids. Basic Concepts: Unit Systems, Mechanical energy balances; Fluid mechanics: Fluid static and its applications; Basic Equations of Fluid Flow; Flow of Incompressible Fluids in Conduits and Thin Layers; Flow of compressible Fluids; Flow of Fluids Through Fixed Beds; Transportation of Fluids and measuring Flow Speed; Agitation and mixing of Liquids.

MEK317 (Eng) Fluid Mechanics 4+0 5.0

Basic Concepts: Unit Systems, Mechanical energy balances; Fluid mechanics: Fluid static and its applications; Basic Equations of Fluid Flow; Flow of Incompressible Fluids in Conduits and Thin Layers; Flow of compressible Fluids; Flow of Fluids Through Fixed Beds; Transportation of Fluids and measuring Flow Speed; Agitation and mixing of Liquids. Basic Concepts: Unit Systems, Mechanical energy balances; Fluid mechanics: Fluid static and its applications; Basic Equations of Fluid Flow; Flow of Incompressible Fluids in Conduits and Thin Layers; Flow of compressible Fluids; Flow of Fluids Through Fixed Beds; Transportation of Fluids and measuring Flow Speed; Agitation and mixing of Liquids.

MEK323 (Eng) Fundamentals of Fluid Mechanics 4+0 6.5

Definition of Fundamental Fluid Mechanics Terms Like Pressure Viscosity etc., Stationary Fluids and Hydrostatic; Eulerian and Lagrangian flow Analysis; Bernoulli Equation and its Applications; Boundary Layer Definition; Boundary Layer Theory; Reynolds Transport Theory; Dimensional Analysis and Meaning of the Non-dimensional Parameters, Pipe Flow and its Applications; External Flow and its Applications; Open Channel Flow and its Applications; Design of Fluid Systems.

MEK403 (Eng) Strength of Materials II 3+0 4.5

Three Dimensional Stress Analysis; Bending with Shear; Shear Centre; Investigation of Elastic Curve by Different Methods: Effect of shear; Normal Force and Bending: Nucleus, Materials not resisting tension, Second rank theory; Torsion with Bending; Virtual Work Theorem: Betti's and Castigliano's theorems; Principles of Minimum; Elastic Stability: Euler conditions, Torsion outside elastic zone; Approximate Methods, Rayleigh Ratio. Three Dimensional Stress Analysis; Bending with Shear; Shear Center; Investigation of Elastic Curve using Different Methods: Effect of shear; Normal Force and Bending: Nucleus, Materials not resisting tension, Second rank theory; Torsion with Bending; Virtual Work Theorem: Betti's and Castigliano's theorems; Principles of Minimum; Elastic Stability: Euler conditions, Torsion outside elastic zone; Approximate Methods, Rayleigh Ratio.

MEK404 (Eng) Applied Fluid Mechanics 2+2 5.0

Fundamental Concepts of Fluid Dynamics; Conservation Laws; Mathematical Models; Mathematical Classification of Flows; Components of Numerical Solutions; Introduction to Finite Differences; Concepts of Finite Differences; Introduction to Finite Volumes; Concepts of Finite Volumes; Introduction to Finite Elements; Concepts of Finite Elements; Iteration Methods; Examples; Laminar Flows; Examples; Turbulent Flows.

MEK405 (Eng) Applied Strength of Materials 3+0 5.0

Analysis of Stress; Definition of Strain; Stress and Strain Relations; Strain Energy and its Components; Airy Stress Function; Solution of Simple Elasticity Problems; Yield Criteria; Bending Moments of Inertia in Beams; Bending and Elementary Theory of Bending in Beams; Theory of Torsion of Circular Bars; Torsion Membrane Analogy; Castigliano's Theorem; Principle of Minimum Potential Energy; Plastic Behavior of Materials.

MEK406 (Eng) Mechanical Vibrations 3+0 5.0

Kinematics of Vibration, Single-degree of freedom systems, Undamped free vibrations, Determining natural frequencies via energy method, Rayleigh method, Damped free vibrations, Viscous damped vibrations, Logarithmic decrement, Forced damped vibrations, Vibration isolation, Two degree of freedom systems, Dynamic vibration absorber, Multi-degree of freedom systems, Torsional vibrations.

MEK439 (Eng) Thermal System Design 2+2 5.0

Concepts of Thermal System Design; Mathematical Modeling; Optimization Methods; Fans, Pumps, Heat exchangers, Nozzles and diffusers, Pipe flow; Steady-state Simulations of Complex Thermal Systems; Applications of the Principles of Thermodynamics, Heat Transfer and Fluid Mechanics in Designing Thermal System and its Components; Features of the Components and their Effect on the General System Performance.

MKM101 Technical Drawing for Mechanical Engineers 2+2 5.0

Importance of Technical Drawing and Standards in Engineering; Drawing Lines and their Meaning in Technical Drawing; Technical writing; Principles of Dimensioning and Tolerancing, Principles of Projections; Drawing of Views; Section Views; Surface finishing symbols, Machine materials symbols; Machine Assembly Drawing; Machine Elements Drawing; Welding Symbols; Dimensional tolerances; Geometric Tolerances.

MKM102 Introduction to Mechanical Engineering 3+0 6.0
(Eng)

History and Emergence of Mechanical Engineering; Engineering Profession and the Place of Mechanical Engineering in It; Development of Mechanical Engineering; The General Definitions, Importance and Working Areas of Mechanical Engineering and Engineering Ethics; Basic Concepts and Subjects, Fields of Work, Qualifications and Skills of Mechanical Engineers; An Overview of the Mechanical Engineering Program at Anadolu University.

MKM103 Technical English for Mechanical Engineers 2+0 2.0
(Eng)

Basics of Engineering; Main Branches of Engineering and Relations between them; Engineering Materials, Terms Related with Materials: Metals, Alloys, Thermo plastics; Grammar Revision: Active vs. Passive, Adjective vs. Adverb; Materials Technology; Metals and their Molecular Structure; Mechanisms of Deformation, Alloys, Thermoplastics, and Composites; Physical Forces and Mathematical Formulae; Chipping Machining, Cutting, Sawing, Milling, Drilling; Turbofan, and the Forces Involved; Alternative Energy, Hydroelectric Power Plants, Heat Pump, Solar Energy, Wind Power; Car Technology: Combustion, Hybrid, and Electric Car Engines.

MKM104 Computer Aided Engineering Technical Drawing 2+2 5.0

Introduction to Computer Aided Technical Drawing; Sketch Modeling; Assigning Geometric Constraints to Sketches; Projection Drawings; General Concepts in Three Dimensional Modeling; Creating Parts in Three Dimensional Design and Solid Modeling; Dimensioning Principles; Arranging Models; Sectioning; Assembly Modeling; Machinery and Construction Parts; Creating Animations and Simulations.

MKM220 Problem Solving Methods 3+0 4.5

Introduction to Engineering Design and Engineering Problem Solving; Engineering Problem Solving Format, Problem description, Problem classification, Problem analysis; Problem Solving Methods; TRIZ Method; 6 Sigma and Engineering; Computer Assisted Problem Solving Methods; Design of Experiments; Analysis of Variable Data; ANOVA; Presentation and Reporting Methods; Complex Problem Solving Applications.

MKM301 Theory of Machines 3+0 7.0

(Eng)

Mechanisms and Element pairs; Kinematic Chains; Kinematic Analysis and Synthesis of Planar Mechanisms; Dynamics of Machines; Cam Design; Gears and Gear Systems; Linkage Mechanisms; Force Analysis of Machines; Mass Balancing in the Machines; Undamped, Damped and Forced Vibrations of Single Degree of Freedom Systems; Vibration Measuring Instruments, Vibration Control and Isolation; Flywheels; Gyroscopes.

MKM302 Machine Design I 4+0 6.0

(Eng)

Importance of Machine Elements in Constructional Activities; Principles of Calculations, Forming and Use of Machine Elements; Materials and Processes; Load Calculations; Stress, Strain and Deflection; Static Failure Theories; Fatigue Failure Theories; Surface Failure; Shafts, Keys and Couplings; Bearings and Lubrication; Gears; Springs; Welded Joints, Shape and force-bound shaft connections, Pins and pivot pins, Bolt joints and screw mechanisms.

MKM303 Heat Transfer 4+0 5.0

(Eng)

Fundamentals of Heat Transfer; Equation of Heat Conduction; Steady-state and Transient One or Multi-dimensional Heat Conduction; Numerical Methods and Applications; Laminar, Turbulent and Forced Convection and Natural Convection; Heat Transfer during Phase Transition; Heat Exchangers and Design of Heat Exchange Systems; Heat Transfer on Extended Surfaces; Heat Transfer through Radiation.

MKM304 Manufacturing Techniques 2+2 5.0

(Eng)

Introduction to Traditional and Advanced Manufacturing Processes and their Comparison; Overview, Principles and Applications of Casting and Joining Processes; Bulk Deformation Processes (Forging; Rolling and Extrusion); Sheet Metal Forming Processes, Machining, Powder Metallurgy; Surface Technologies; Coating, Classification of Non-Traditional and Micro Level Manufacturing Methods, DFX (Design for X); Engineering Economics; Engineering Metrology; Quality Engineering; Automation and Plant Layout; Computer Integrated Manufacturing; Lean Production.

- MKM305 Introduction to Finite Element Analysis 3+0 3.5**
 One and Two Dimensional Elements: Springs and truss elements, Beam elements, Plane stress and plane strain elements; Finite elements and interpolation functions; Types of Analysis: Elastostatic problems, Heat transfer problems, Dynamic interaction problems; Solution Components of Finite Element Analysis: Mass matrix, Time integration, Plate formulations, Locking problem, Convergence criteria.
- MKM306 Experimental Engineering 2+2 4.0**
(Eng)
 Introduction to Experimental Methods; Measurement Systems and their Basic Elements; Data Collection Systems; Filters and Amplifiers; Length Measurements; Temperature Measurements; Pressure Measurements; Stress Measurements, Optical Measurements, Preparation of experimental setup and measurement chain; Introduction to Statistics; Signal Quality and Data Processes, Signal processing and Evaluation of Data Analysis, Signal processing methods; Fourier Transform and Frequency Analysis; Uncertainty Analysis.
- MKM307 Engineering Materials for Mechanical Engineers 3+0 5.0**
 Introduction to Materials Science; Introduction to engineering materials; Metal-based materials; Ceramic materials; Composite materials; Polymer materials; Improving material properties; Fundamentals of Material selection; Material selection in terms of mechanical and physical properties; Diagrams used in material selection; Engineering alloys; Science of Metallography and Surface treatments; Advanced Engineering Materials.
- MKM339 Introduction to Finite Element Method 2+2 5.0**
(Eng)
 Introduction to the Fundamentals of Finite Element Method (FEM), Static Models, Formulation Methods, Ritz and Rayleigh-Ritz Method; Variational and Incremental Methods; Application of FEM to Rayleigh-Ritz and Galerkin Methods; One and Two Dimensional Elements, Springs and Truss Elements; Beam Elements; Plane Stress and Plane Strain Elements; Finite Elements and Interpolation Functions; Elastostatic Problems, Heat Transfer Problems, Mass Matrices, Time Integration, Plate Formulations, Locking Problem, Convergence Criteria.
- MKM401 Machine Design II 4+0 6.0**
(Eng)
 Shaping of Shafts and Axes, Deformation and calculation of vibrations; Description of Roller Bearings, Determination of bearing dimensions and bearing life at static and dynamic loads; Description of Journal Bearing, Determination of capability of carrying load and bearing heat; Gears, Description of Gear Wheel Mechanisms, Calculation and sizing of strength; Description, selection, sizing, calculation methods and standards of belt-pulley mechanisms.
- MKM403 Mechanical Engineering Design I 2+2 5.0**
 Introduction to the Fundamental Mechanical Engineering Fields: Materials, Automotive, Energy machines, Robotics and system control; General Machine Design; Selection of the Design Project based on Fundamental Mechanical Engineering Fields; Studies about the Selected Design Project: System analysis, Conceptual design, Predesign; Detailed Design: Dimensioning, Strength of materials calculations and engineering analyses; Documentation of Project Design Studies: Documentation and oral presentation of numerical or experimental analyses at the end of the semester.
- MKM404 Mechanical Engineering Design II 2+4 5.0**
 Introduction to the Current Studies on Fundamental Mechanical Engineering Research Fields; Materials, Automotive, Energy machines, Robotics and system control; Selection of the Design Project on Fundamental Mechanical Engineering Fields; Studies on Selected Project: Literature review, System analysis, Conceptual design, Predesign; Research Project Selection; Determination of the Theoretical, Modeling and/or Experimental Stages of the Research; Detailed Design of the Research Project: Determining the steps of the theoretical and/or experimental studies; Documentation of the Research Studies: Documentation and oral presentation of the numerical and/or experimental analyses at the end of the semester.
- MKM405 Machining and Machine Tools 3+0 5.0**
 Introduction: Fundamentals of Machining, Machining Mechanics, Machining Dynamics, Machining Parameters: Machining Quality and Tool Life, Machine Tools and Machining Operations: Turning, Milling, Drilling, Broaching, Grinding. Machine Tool Design, Cutting Tools and Jigs and Fixtures: Cutting Tool Materials, Process Planning: Economic Analysis of Machining, Machining Automation. Machining and Sustainable Manufacturing
- MKM406 Reliability in Machine Design 3+0 5.0**
 Introduction to Reliability in Machine Design; Safety Factor in Machine Design; Basics of the Statistics; Frequency Distribution Functions and Reliability; Reliability in Static and Dynamic Loading; Cumulative Fatigue Damage and Determination Service Life; Wear: Wear rate, Statistical calculation method in wear, Exponential distribution function applied in wear computation, Wear and reliability; Analytic Relationship Between Safety factor and Reliability; Application of Reliability and Life Estimation on the Different Engineering Applications.

MKM407 Maintenance in Mechanical Engineering 3+0 5.0

Knowledge About Maintenance and Maintenance engineering: Maintenance, Fault, Control and Revision concepts; Balancing: Shaft alignment and rotor balancing; Bearings, Couplings and Clutches: Applications, Properties and Maintenance; Seals: Properties and types; Knowledge of Gears and Driving mechanisms and Maintenance; Centrifugal Pumps: Properties and applications; Maintenance of Centrifugal Fans and Compressors; Lubricants: Types, Greases and synthetic lubricants; Lubricant Applications: Hydraulics, Internal combustion engines and automotive components, Other industrial applications.

MKM408 Non-destructive Testing Methods 3+0 5.0

Elements of liquid/dye penetrant inspection method, its pros and cons, and detailed application steps; Elements of evaluation method using magnetic particles, its pros and cons, and detailed application steps; Elements of ultrasonic inspection method, its pros and cons, and detailed application steps; Elements of inspection method with Eddy currents, its pros and cons, and detailed application steps; Basics and technology of X-ray inspection, and its field of application; Basics and technology of scanning electron microscope (SEM), and its field of application; Industrial value of NDT; Career opportunities as an accredited NDT personnel from engineering perspective.

MKM409 Shape Memory Alloys 3+0 5.0

Overview of Active Materials; Introduction to Shape Memory Alloys; Mechanism of shape memory effect and superelasticity; NiTi shape memory alloys; Cu- based shape memory alloys; Fabrication of shape memory alloys; Characteristics of shape memory alloys; Thermomechanical Characterization of Shape memory Alloy; Thermomechanical Constitutive Modeling of Shape Memory Alloys; Shape memory polymers; Shape memory ceramics; Applications of shape memory alloys.

MKM410 Aircraft Engine Design 3+0 5.0

General design consideration of aircraft engine; Gas turbine performance analysis and selection of component operating conditions; Mission analysis and relation with performance analysis; Interface definitions; Design approach of turbine and compressor; Combustion chamber and afterburner design; Air intake and exhaust system design.

MKM411 System Engineering Fundamentals 3+0 5.0

Definition of System Engineering and its fundamental processes; Requirement analysis and management; Design inputs and approach; Qualification and validation processes; Operations and maintenance process; Decision management; Risk and opportunity analysis; Product development and strategies; System engineering planning and organization.

MKM412 Internal Combustion Engines 3+0 5.0

Definitions and classification of internal combustion engines; Operation principles; Otto and Diesel cycle analysis; Comparison of Otto, Diesel and Hybrid cycles ; Characteristics of engine fuels and combustion chemistry; Analysis of air-fuel cycles; Properties of real cycles; Air capacity and volumetric efficiency; Engine knocking and ignition delay; Classification of fuel injection systems; Forces acting on engine elements; Supercharging of internal combustion engines

MKM413 Engineering Applications of Finite Element Analysis 3+0 5.0

Introduction to ANSYS Workbench Software: Project management page, Work flow, Analysis systems, Component systems, Design tools, User interface, Basic analysis procedure; Mechanical Basics: Preliminary decisions, Pre-processing, Solving procedure, Post-processing, Menus and toolbars; General Pre-processing: Material properties, Geometry creation, Contact algorithms, Coordinate systems; Meshing Techniques: Global and local meshing controls, mesh quality check; Model Parameters: Connections, Boundary conditions, Loading conditions; Analysis Types: Static structural, Thermal analysis, Modal analysis, Explicit analysis; General Post-Processing.

MKM414 Refrigeration Systems 3+0 5.0

General Aspects of Thermodynamics, Fluid Flow and Heat Transfer: Fundamentals of thermodynamics, Psychrometrics, Fundamentals of fluid flow, Fundamentals of heat transfer; Refrigerants; Refrigeration System Components: Compressors, Condensers, Evaporators, Throttling Devices, Auxiliary devices; Refrigeration Cycles and Systems: Vapor-compression refrigeration systems, Energy analysis of vapor-compression refrigeration cycle, Absorption-refrigeration systems (ARSS), Advanced Refrigeration Cycles and Systems; Heat Pumps: Classification of heat pumps, Vapor-compression heat pump systems.

MKM416 Theory of Elasticity 3+0 5.0

Introduction to Theory of Elasticity; Elasticity; Stress; Notation of Forces and Stresses; Components of Stress and Strain; Hooke's Law; Plane Stress and Strain; Measurement of Surface Strains; Construction of Mohr Strain Circle; Differential Equations of Equilibrium, Boundary Conditions and Compatibility Equations; Strain Energy Methods, Strain Energy, Principle of Virtual Work, Castigliano's Theorem, Principle of Least Work; Plates and Shells.

- MKM417 Nonconventional Manufacturing Techniques 3+0 5.0**
 Introduction: Definition of nonconventional manufacturing methods and general concepts, Benchmarking of conventional and unconventional manufacturing methods; Mechanical Energy Methods: Ultrasonic machining; Abrasive Methods: Water jet cutting; Thermal Methods: Electrical discharge machining, Wire electrical discharge machining; Chemical Machining; Electrochemical Machining; Laser Processing; Plasma Processing; Electron Beam Processing.
- MKM418 Materials Handling Techniques 3+0 5.0**
 Principles of Materials Handling; Classification of Materials Handling Equipment; Pneumatic and Hydraulic Conveyors; Hoisting Equipment; Ropes, Chains, Drums, Pulleys, Block and Tackles, Standard and Ramshorn Hooks, Hook Sleepers and Hook Blocks; Handling Mechanism; Reason of Handling Resistance, Rails, Wheels, Gearwheels; Bulk Handling Equipment and Systems; Brakes; Block Brakes, Band Brakes, Disk Brakes, Cone Brakes; Cranes.
- MKM419 Mechanics of Materials II 3+0 5.0**
 Combined Loading; Stress and Strain: General state of stress, Three-dimensional analysis of strain; Material Property: Generalized hook's law; dilatation, bulk modulus; Theories of Failure: Ductile materials, Brittle materials; Energy Methods: External work and strain energy, Strain energy density, Elastic strain energy for various types of loading, Strain energy for a general state of stress, Conservation of energy, Impact loading, Virtual work.
- MKM420 Manufacturing Quality 3+0 5.0**
 Introduction: Quality concept and awareness; Quality Techniques; Quality Control; Inspection and Tests; Quality Assurance; Quality Development; Quality Planning; Quality Costs; Total Quality Management; Quality Standards; Quality Management Documentation; System Documentation; Internal Audit; Certification; Process Control; Quality Circles; Data Collection and Analysis; Calibration; Quality Improvement Methods; ISO 9000 Standards.
- MKM421 Energy Management and Efficiency 3+0 5.0**
 Energy Resources, the world energy production and consumption, energy production and consumption in Turkey, defining the energy efficiency and savings and its importance, applicable law and director on energy efficiency, energy efficiency and savings potential in industry (in electric motors, compressed air and steam systems) Energy efficiency and saving in buildings (in heating and cooling systems), energy efficiency and saving potential in daily life (in household devices and vehicles), Sample applications related to energy efficiency and saving.
- MKM422 Micro/ Nanoscale Fabrication and Characterization 3+0 5.0**
(Eng)
 Introduction to Micro/Nano-Fabrication Methods; Important Materials Science Concepts in Micro/Nano-Fabrication Processes; Thin Film Deposition; Thin Film Growth; Photolithography; Electron-Beam Lithography; Thermal Oxidation; Wet And Dry Etching; Doping; Wafer Dicing; Wafer Bonding; Characterization Techniques Used During/After Micro/Nano-Fabrication; Example MEMS Devices and Their Working Principles.
- MKM437 Engineering Materials 3+0 5.0**
(Eng)
 Introduction to Engineering Materials; Mechanical and Physical Properties of Materials; Engineering Metals and Alloys; Micro Structure of Metals; Phase Diagrams of Ferrous Alloys; Engineering Plastics; Engineering Ceramics; Composite Materials; Nano Materials; Semi-conductives; Destructive and Non-destructive Testing of Materials; Selection and Development of Materials; Tables on Material Selection; Advanced Materials, Foam Materials; Design with Materials; Engineering Faults and Accidents.
- MKM440 Introduction to Computer Aided Manufacturing 3+0 5.0**
 Basic Knowledge about Computer Aided Manufacturing in the Design Process; Creation of Tool Path in Turning and Milling Process; Selection of Appropriate Tool and Cutting Parameters; Creation of Tool Path for 3D Parts, Formation of M and G Codes for CNC Machines; Three Dimensional CAD Modeling; Feature-Based Modeling; Variational and Parametric Modeling; Tools for PLC Logic Design; Kinematics of NC Machines; Fundamentals of Industrial Control; Rapid Prototyping.
- MKM440 Introduction to Computer Aided Manufacturing 2+2 5.0**
(Eng)
 Basic Knowledge about Computer Aided Manufacturing in the Design Process; Creation of Tool Path in Turning and Milling Process; Selection of Appropriate Tool and Cutting Parameters; Creation of Tool Path for 3D Parts, Formation of M and G Codes for CNC Machines; Three Dimensional CAD Modeling; Feature-Based Modeling; Variational and Parametric Modeling; Tools for PLC Logic Design; Kinematics of NC Machines; Fundamentals of Industrial Control; Rapid Prototyping.
- MLZ109 (Eng) Materials World 2+0 2.5**

Importance of Materials Science; Classification of Materials and Their Production Methods: Ceramics, Polymers, Metallic materials, Composites, Nano materials; Properties of Materials; Crystal Structure of Materials and their Characterisation; Applications of Materials; Sport Materials; Materials in Racing Cars; Aircraft Materials; Bio Materials; Special Materials used in Daily Life; Special Examples for Newly Developed Materials.

MLZ114 (Eng) Structure of Materials **2+0 2.5**

Introduction to materials structures: structure-property-processing-performance relation; Structure of crystalline solids: crystal structure, energy, amorphous materials, pattern, motif; Atomic positions and packaging factor of cubic structures; Stacking and density: Polycrystalline materials, single crystals, anisotropy, polymorphs; Bravais lattices; Crystallographic directions; Crystallographic planes; Structure of metals, semiconductors and ceramics: bonding in metals, semiconductors and ceramics, ionic-covalent character, substitutional and interstitial atoms, interstitial spaces, coordination number; Symmetry of crystals.

MLZ116 (Eng) Freshman Project **1+0 1.0**

Application of Students Projects; Laboratory Capabilities; Literature Research and Assignment of Student Project; Planning of Projects, Creation of Hypothesis; Analysis and Experiment; Evaluation; Presentation of Projects; Education of Interdisciplinary Student Project; Education of TÜBİTAK-BAP Projects, Engineering Problems; Materials Related Problems; Solving Techniques; Student Projects; How to Write a Project; Project Work on the Basis of Materials.

MLZ203 Materials Science **3+0 3.5**

Atomic Structure; Arrangement of the Atoms; Structural Defects: Point defects, Dislocations, Planar defects; Mechanical Tests and Properties: Tension, Compression, Impact test, Hardness, Fatigue; Deformation of the Materials; Metallography: Preparation of the samples, Observation with optic and electron microscope; Treatment Increasing the Strength of the Materials; Solidifying and Cooling Curves, Phase Diagrams; Iron Alloys: Steels, Cast Irons, Heat treatments; Metals and Alloys Excluding Iron: Aluminium, Titanium, Copper alloys. Atomic Structure; Arrangement of the Atoms; Structural Defects: Point defects, Dislocations, Planar defects; Mechanical Tests and Properties: Tension, Compression, Impact test, Hardness, Fatigue; Deformation of the Materials; Metallography: Preparation of the samples, Observation with optic and electron microscope; Treatment Increasing the Strength of the Materials; Solidifying and Cooling Curves, Phase Diagrams; Iron Alloys: Steels, Cast Irons, Heat treatments; Metals and Alloys Excluding Iron: Aluminium, Titanium, Copper alloys.

MLZ203 (Eng) Materials Science **3+0 3.5**

Atomic Structure; Arrangement of the Atoms; Structural Defects: Point defects, Dislocations, Planar defects; Mechanical Tests and Properties: Tension, Compression, Impact test, Hardness, Fatigue; Deformation of the Materials; Metallography: Preparation of the samples, Observation with optic and electron microscope; Treatment Increasing the Strength of the Materials; Solidifying and Cooling Curves, Phase Diagrams; Iron Alloys: Steels, Cast Irons, Heat treatments; Metals and Alloys Excluding Iron: Aluminium, Titanium, Copper alloys. Atomic Structure; Arrangement of the Atoms; Structural Defects: Point defects, Dislocations, Planar defects; Mechanical Tests and Properties: Tension, Compression, Impact test, Hardness, Fatigue; Deformation of the Materials; Metallography: Preparation of the samples, Observation with optic and electron microscope; Treatment Increasing the Strength of the Materials; Solidifying and Cooling Curves, Phase Diagrams; Iron Alloys: Steels, Cast Irons, Heat treatments; Metals and Alloys Excluding Iron: Aluminium, Titanium, Copper alloys.

MLZ204 Materials of Construction **3+2 5.0**

Cementation Materials; Lime, Cement, Pozzolans; Physical and Mechanical Properties; Aggregates: Properties, Experiments; Factors Affecting the Strength of the Concrete; Properties of Fresh Concrete; Calculation of Concrete Mix; Production and Curing of the Concrete; Reinforcement Steels and Properties; Metals and Alloys; Other Alloys Used in Structures; Glasses; Plastic Based Materials; Wood. Cementation Materials; Lime, Cement, Pozzolans; Physical and Mechanical Properties; Aggregates: Properties, Experiments; Factors Affecting the Strength of the Concrete; Properties of Fresh Concrete; Calculation of Concrete Mix; Production and Curing of the Concrete; Reinforcement Steels and Properties; Metals and Alloys; Other Alloys Used in Structures; Glasses; Plastic Based Materials; Wood.

MLZ204 (Eng) Materials of Construction **3+2 5.0**

Cementation Materials; Lime, Cement, Pozzolans; Physical and Mechanical Properties; Aggregates: Properties, Experiments; Factors Affecting the Strength of the Concrete; Properties of Fresh Concrete; Calculation of Concrete Mix; Production and Curing of the Concrete; Reinforcement Steels and Properties; Metals and Alloys; Other Alloys Used in Structures; Glasses; Plastic Based Materials; Wood. Cementation Materials; Lime, Cement, Pozzolans; Physical and Mechanical Properties; Aggregates: Properties, Experiments; Factors Affecting the Strength of the Concrete; Properties of Fresh Concrete; Calculation of Concrete Mix; Production and Curing of the Concrete; Reinforcement Steels and Properties; Metals and Alloys; Other Alloys Used in Structures; Glasses; Plastic Based Materials; Wood.

MLZ208 (Eng) Electrical, Magnetic and Optical Properties of Materials **2+0 3.0**

Introduction to applications of solid-state physics; Crystal anisotropy; Electrical properties of materials: Electrical band structure, Real and imaginary part, Thermal conductivity, Ionic conductivity; Magnetic properties of materials: Ferromagnetic, ferrimagnetic, paramagnetic, diamagnetic, antiferromagnetic properties; Optical properties of materials:

Optical spectrum, Optical absorption, diffraction, transparency and refraction, Intrinsic factor, Real and imaginary part of dielectric factor, Non-linear optic; Multifunctional effects: Magneto-electric, Magneto-resistive, Magneto-optic-, Opto-electric, Thermo-electric, Ferro-electric, Piezo-electric effects.

MLZ216 (Eng) Mechanical Behaviour of Materials I 2+0 3.0

The Analysis of the Mechanical Behavior of Materials: Stress, Strain, Elasticity, Plasticity, Ductile versus brittle behavior; Factors Affecting Stress-Strain Relationship: Bonding types, Defects, Second phases and their effects on deformation behavior; Dislocation Theory; Strengthening Mechanisms; Mechanical Tests: Tension, Compression, Hardness, Impact; Creep: Effect of temperature on deformation.

MLZ218 (Eng) Ceramic Processing 2+0 3.0

Introduction to Ceramic Materials and Applications; Ceramic Powders: Definitions, Properties, Requirements; Ceramic Raw Materials: Common raw materials, Special inorganic chemicals; Ceramic Characterisation: Processing Additives: Liquids, Surfactants, Deflocculants and Coagulants; Stability of Ceramic Suspensions; Importance of Interfaces; Charged Interfaces and Electric Double Layer; DLVO Theory; Deflocculation of Clays; Rheological Properties and Measurements; Shaping Methods: Slip casting, Dry and isostatic pressing, Additive manufacturing, Plastic shaping and others; Drying; Sintering: Solid state sintering, Liquid phase sintering, Vitrification.

MLZ221 (Eng) Physical Properties of Materials 2+0 2.5

Introduction to Materials Science and Engineering; Atomic Structure and Chemical Bonding; Crystal Structures; Solidification, Crystalline Imperfections and Diffusion in Solids; Mechanical Properties of Metals; Polymeric Materials; Phase Diagrams; Engineering Alloys; Ceramic Materials; Composite Materials; Corrosion; Electrical Properties of Materials; Optical Properties; Superconducting Materials; Magnetic Materials.

MLZ222 (Eng) Materials Characterization Techniques Laboratory 0+2 3.0

Specimen Preparation Laboratory; Optical Microscope Laboratory; Scanning Electron Microscope Laboratory; Microanalysis Techniques Laboratory; Atomic Force Microscope Laboratory; X-ray Diffraction Laboratory; X-ray Fluorescence Laboratory; Thermal Analysis Laboratory. Specimen Preparation Laboratory; Optical Microscope Laboratory; Scanning Electron Microscope Laboratory; Microanalysis Techniques Laboratory; Atomic Force Microscope Laboratory; X-ray Diffraction Laboratory; X-ray Fluorescence Laboratory; Thermal Analysis Laboratory.

MLZ223 (Eng) Polymer Chemistry (2+0 3.0

Structure and Bonding of Organic Compounds; Nomenclature of Organic Molecules; Classes of Hydrocarbons; Mechanism of Organic Reactions; Functional Groups; Classification of Polymers; Polymer Structure (Morphology); Molecular Weight of Polymers; Introduction to Polymerization Techniques; Step-Reaction Polymerization; Ionic Chain Reaction and Complex Coordination Polymerization; Free Radical Chain Polymerization; Co-Polymerization; Types of Co-Polymers.

MLZ225 (Eng) Raw Materials and Unit Operations 2+0 3.0

Processing of Ores Concentrates, Recycled and Partially Processed Raw Materials to Render them Amenable to Further Metallurgical Treatment; Process Flowsheets and Details of Physical and Chemical Separation Methods for the Concentration of Raw Materials; Principles and Applications of Mineral Processing; Pretreatment Processes; Drying, Calcinations, Roasting and Agglomeration.

MLZ229 (Eng) Materials Characterization Techniques I 2+0 3.0

Importance of Characterization; Properties and Production of X-rays; Interaction between X-Rays and Solid; Bragg Law and Diffraction; The Use of X-Rays; Intensity of Diffracted Peaks; Calculation of Expected Theoretical Patterns; The Identification of Phases Obtained from Different Materials; Heat-Solid Interactions; Thermal Analysis Techniques; Properties Measured by Thermal Analysis; Thermogravimetric Analysis (TG); Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC) and Simultaneous Thermal Analysis; Dilatometry; Interpretation of TG, DTA, DSC and Dilatometer Curves; Parameters Effecting the Thermal Analysis Results; Quantitative Analysis.

MLZ230 (Eng) Materials Characterization Techniques II 2+0 3.5

Importance of Microstructure; Microscopic Characterization Techniques; Brief History of Microscopes; Specimen Preparation; Light-Solid Interactions and the Resulting Signals; Light Microscopes, Types of Light Microscopes and Contrast Techniques; Resolution, Aberrations and Why We Need to Use Electron Microscopes; Interactions Between Electrons and Solids; Light vs Electrons; Scanning Electron Microscopes (SEM); Imaging Techniques in SEM; Chemical Analysis Techniques for SEM; Qualitative and Quantitative Analysis; Important Parameters to Obtain Best Results; Transmission Electron Microscopy (TEM) and Imaging Techniques; Diffraction and Chemical Analysis in TEM.

MLZ231 (Eng) Materials Thermodynamics I 2+1 4.5

Basics of Thermodynamics; First Law of Thermodynamics and Enthalpy; Kirchhoff Equation; Hess Law; Fuels and Adiabatic Flame Temperature; Second Law of Thermodynamics and Entropy; Third Law of Thermodynamics and Free

Energy; Maxwell Relations; Phase Transformations in One-Component Systems; Ellingham Diagrams; Carbothermic Reduction; Metallothermic Reduction.

MLZ232 (Eng) Introduction to Materials Science 3+0 3.5

Introduction to Materials Science; Atom and the Crystal Structure; Solid State Diffusion; Imperfections in Solids; Dislocations and Strengthening Mechanisms; Mechanical Properties of Materials and Materials Testing: Tension, Compression, Torsion, Bending, Impact, Creep testing; Ferrous and Non-ferrous Alloys; Fracture; Phase Diagrams and Iron-Carbon Phase Diagram; Polymers; Ceramics; Composite Materials.

MLZ307 (Eng) Phase Diagrams 3+0 4.5

Thermodynamic and Phase Equilibria; One Component System Phase Diagrams; Two Component System Phase Diagrams: Binary eutectic, Intermediate compounds, Solid solution, Liquid immiscibility; Determination of Phase Diagrams: Experimental methods, Thermodynamic estimations and calculations; Ternary Systems: Method of determining composition, Isolethal studies in ternary systems, Binary and ternary intermediate compounds, Solid solutions; Four and Six Component Systems.

MLZ314 (Eng) Transport Phenomena in Materials Processing 4+0 6.0

Introduction to Transport Phenomena: Momentum transfer, Heat transfer and mass transfer; Applications of Transport Phenomena in Material Processing; Fluid Flow in Materials Processing: Crystal growth, Fiber processing, Continuous casting; Heat Transfer in Material Processing: Powder processing, Die casting, Welding; Mass Transfer in Material Processing: Crystal growth, Casting, Semiconductor device fabrication.

MLZ315 (Eng) Electrochemistry 1+0 1.5

Introduction to Electrochemistry; Electrolytic Conductance: The theory of electrolytic conductance, The migration of ions, Free energy and activity; Reversible Cells; Electrode Potentials: Oxidation-reduction systems, Acid and bases, The determination of hydrogen ions, Neutralization and hydrolysis, Nernst equations; Amphoteric Electrolytes, Polarization and Overvoltage; The Deposition and Corrosion of Metals; Electrolytic Oxidation and Reduction.

MLZ318 (Eng) Metallic Materials 4+0 4.0

Fe-Fe₃C equilibrium phase diagram; Heat Treatment of Steels; Time-Temperature-Transformation Diagrams; Alloy Steels; Tool Steels; Standard Designation of Iron Base Alloys; D.I.N Standards; AISI/SAE Standards; White, Gray, Tempered and Nodular Cast Irons; Nonferrous Metals and Alloys; Copper and its Alloys; Aluminum and its Alloys; Nickel and its Alloys; Titanium and its Alloys. Fe-Fe₃C equilibrium phase diagram; Heat Treatment of Steels; Time-Temperature-Transformation Diagrams; Alloy Steels; Tool Steels; Standard Designation of Iron Base Alloys; D.I.N Standards; AISI/SAE Standards; White, Gray, Tempered and Nodular Cast Irons; Nonferrous Metals and Alloys; Copper and its Alloys; Aluminum and its Alloys; Nickel and its Alloys; Titanium and its Alloys.

MLZ324 (Eng) Instrumental Analysis 3+0 4.0

Characteristics of Electromagnetic Radiation; Instruments of Optical Spectroscopy; Introduction to Molecular ultraviolet/ Visible and Near-infrared Absorption Spectroscopy; Application of Molecular Ultraviolet/ Visible Absorption Spectroscopy; Atomic Absorption Spectroscopy; Infrared Absorption Spectroscopy; Nuclear Magnetic Resonance Spectroscopy; Mass Spectroscopy; Thermal Methods; Introduction to Chromatographic Separations; Gas Chromatography; High Performance Chromatography. Characteristics of Electromagnetic Radiation; Instruments of Optical Spectroscopy; Introduction to Molecular ultraviolet/ Visible and Near-infrared Absorption Spectroscopy; Application of Molecular Ultraviolet/ Visible Absorption Spectroscopy; Atomic Absorption Spectroscopy; Infrared Absorption Spectroscopy; Nuclear Magnetic Resonance Spectroscopy; Mass Spectroscopy; Thermal Methods; Introduction to Chromatographic Separations; Gas Chromatography; High Performance Chromatography.

MLZ326 (Eng) Project Management 1+0 2.0

What is a Project?; Introduction to Project and Project Management; Classification of Projects; The Process Groups during Project Management; The Project Management Life Cycle; Project Management Knowledge Areas; Project Integration Management; Project Scope Management; Project Schedule Management; Project Cost Management; Project Quality Management; Project Resource Management; Project Communications Management; Project Risk Management; Project Procurement Management; Project Stakeholder Management; Project Planning; The Triple Constraints Triangle; Project Manager Skills; Different Project Methodologies; Project Writing and Presenting.

MLZ327 (Eng) Mechanical Behaviour of Materials II 2+0 3.0

Overview of Mechanical Properties/Behaviours of Materials; ASTM Standards; Mechanical Properties/Behaviours of Metals; Elastic/Plastic Deformation; Tensile Properties; Dislocations; Strengthening Mechanisms in Metals; Hardness; Design/Safety Factors; Mechanical Properties/Behaviours and Toughening Mechanisms in Ceramics; Test Methods; Weibull Modulus; Thermal Stress/Shock Parameters; Thermal Properties/Behaviours of Materials; Mechanical Properties/Behaviours, Mechanisms of Deformation and for Strengthening of Polymers; Mechanical Properties/Behaviours and Toughening Mechanisms of Composites; Fundamentals/Principles of Fracture Mechanics; Fatigue; Creep.

MLZ328 (Eng) Materials and Energy Balance 2+0 3.0

Introduction to Engineering Calculations; Process and Process Variables; Fundamentals of Materials Balances: Process classification, Recycle and bypass, Stoichiometric calculations, Combustion reactions; Single Phase Systems; Multiphase Systems; Energy Balances: Energy balance on closed systems, Energy balance on open systems; Energy Balance on Nonreactive Process; Materials and Energy Balance Applications for Selected Process.

MLZ329 (Eng) Materials Thermodynamics II 2+1 4.5

Introduction to Solutions Thermodynamics; Partial Molar Thermodynamic Properties; Integral Molar Thermodynamic Properties; Ideal Solutions; Raoult's Law; Non-ideal Solutions; Gibbs-Duhem Equation; Regular Solutions; Thermodynamic Excess Properties; Activity-composition Relations in Binary Phase Diagrams; Alternative Standard States; Gibbs Phase Rule; Thermodynamics of Electrochemical Cells.

MLZ330 (Eng) Silicate Ceramics 2+0 3.0

Silicate Ceramic Industry Overview; Raw Materials for Silicate Ceramics; Ceramic Tiles: Porous and Vitreous Tile Formulations, Critical Issues in Production; Ceramic Sanitarywares: Porous and Vitreous Sanitaryware Formulations; Critical Issues in Production; Ceramic Tableware: Porous and Vitreous Tableware Formulations; Critical Issues in Production; The Definition of Ceramic Glazes and The Raw Materials Used in Glaze Production; Major Oxides, Raw Materials Supplying the Relevant Oxides, Application Fields of Glazes, Other Incorporations to Glaze Batches, Certain Glaze Systems; Glass-ceramic Glaze Systems, Glaze Defects and Corrections.

MLZ331 (Eng) Materials Processing Laboratory I 0+2 4.5

Characterisation of Ceramic Powders and Raw Materials: Raw material preparation, Ore dressing, Particle Size Analysis, Density Measurements, Archimedes rules, Water absorption experiment; Traditional Ceramic Processes: Wall tile production, floor tiles production, Sanitaryware production, Porcelain production; Frits and Glazes; Advanced Structural Ceramics, Sintering of Alumina; Extrusion, Thin Film Technics.

MLZ332 (Eng) Processing of Polymers 2+0 3.0

Introduction to the Science of Large Molecules; Polymerization; Condensation and Addition Polymerization, Ionic and Coordination Chain (addition) Polymerization, Copolymerization, Polymerization Conditions and Polymer Reactions, Characterization; Polymer Solutions, Measurement of Molecular Weight and Size, Analysis and Testing of Polymers, Structure and Properties; Morphology and Order in Crystalline Polymers, Rheology and the Mechanical Properties of Polymers, Polymer Structure and Physical Properties, Properties of Commercial Polymers; Hydrocarbon Plastics and Elastomers, Other Carbon-Chain Polymers, Heterochain Thermoplastics, Polymer Production.

MLZ333 (Eng) Phase Diagrams 2+0 3.0

Thermodynamics and Phase Equilibrium, Phase Diagrams of Single Component Systems, Phase Diagrams of Two Component Systems, Solidification of Liquids in Two Component Equilibrium Diagrams, Solid Solutions, Congruently and Incongruently Melting Intermediate Compounds, Immiscibility of Liquids, Drawing of Phase Diagrams, Experimental Methods, Thermodynamic Calculations, Phase Diagrams of Three Component Systems, Determination of Composition, Solidification of Liquids in Three Component Equilibrium Diagram, Intermediate Compounds in Three Component Systems, Solid Solutions, Phase Diagrams of Four Component Systems.

MLZ334 (Eng) Fundamentals of Semiconductors 2+0 3.0

Introduction to Semiconductors: Conductors, Semiconductors, Insulators, Band theory, Crystalline, Polycrystalline and amorphous materials; Growth Techniques for Semiconductors: Czochralski, Chemical vapor deposition, Molecular beam epitaxy, E-beam deposition, Sputtering; Characterization Technique: Photoluminescence spectroscopy, Fourier transform infrared spectroscopy, Raman spectroscopy, I-V, C-V; Applications of Semiconductors: PNP transistors, NPN transistors, Field effect transistors, LED, Solar cells; Fabrication Steps of Semiconductor Devices: Oxidation, Photolithography, Etching, Diffusion and doping with ion implantation, Metallization.

MLZ335 (Eng) Metallic Materials I 2+0 3.0

Theory of Alloying: Why and how alloying is done?; The Parameters That Affect Solid Solubility: Phase, Phase mixture, Formation of secondary phases, Intermetallics; The Effects of Alloying Additions, Grain Size, Secondary Phases on Mechanical Performance; The Effects of Deformation and Heat Treatment: The effects of cold deformation, Annealing, Ageing, Etc.; Non-Ferrous Alloys (Al, Cu, Ti alloys).

MLZ336 (Eng) Metallic Materials II 2+0 3.0

Classification of Steels and Cast Irons; Metastable Iron-Cementite and Stable Iron-Graphite Equilibrium Phase Diagrams; Lever rule, Microstructure development of steels and cast irons, Carbon solubility of austenite and ferrite; Phase Transformations in Steels: Embryo and nucleus, Homogeneous and heterogeneous nucleation, Supercooling, Nucleation

rate, Growth rate, Avrami equation, Isothermal transformation and continuous cooling transformation diagrams, Non-equilibrium phases; Steel Standards; Alloy Steels: Alloying elements, Impurities, High strength-low alloy steels, Tool steels.

MLZ337 (Eng) Transport Phenomena in Materials Processing I 2+0 3.0

Introduction to Transport Phenomena; Fluid Dynamics: Properties of fluids, Laminar flow and momentum balances, Energy balance applications in fluid flow, Flow from Ladles, Flow through piping networks; Heat Transfer: Thermal conductivity of materials, Heat transfer and the energy equation, Convection and heat transfer correlations, Conduction heat transfer, Conduction of heat in solids, Solidification of metals, Radiation heat transfer.

MLZ338 (Eng) Transport Phenomena in Materials Processing II 2+0 3.0

Mass Transport: Fick's Laws and diffusivity of materials, Kirkendall effect, Diffusion in ceramic materials, Ambipolar diffusion, Role of defects in diffusion, Kröger-Vink notation system; Steady-State and Non-Steady State Diffusion; Thin Film Source; Diffusion Couple with Variable Diffusion Coefficient; Finite System Solutions; Microelectronic Diffusion Processing; Homogenization of Alloys.

MLZ339 (Eng) Non-Crystalline Materials 2+0 3.0

Introduction: Identification of crystalline and non-crystalline materials, Production of non-crystalline materials from solid, liquid and gas systems, Polymers; The Differences between Crystalline and Non-Crystalline Solids: Glass Formation: Structural models, kinetic models; Using of Sol-Gel Technique in the Production of Non-Crystalline Solids: Chemical Composition in Oxide Based Glasses: The properties of oxide based glasses; Colour Formation in Glass: The effect of chemical composition, Different colouring methods; Various Glass Systems; Glass Production Processes.

MLZ342 (Eng) Whitewares 2+0 3.0

Traditional Ceramic Raw Materials: Clay, Quartz, Feldspar and Other Raw Materials; Role of Raw Materials in Traditional Ceramic Bodies and Physical and Chemical Changes During Firing; Wall, Floor And Porcelain Tile Bodies and Their Production Methods; Frit and Glaze Preparation; Digital Decoration; Sanitaryware Bodies and Their Production Methods; Waste Management in Traditional Industry; Energy Efficiency in Traditional Industry.

MLZ413 (Eng) Powder Metallurgy 3+0 4.0

Principles of the P/M Process; Powder Characterization, Properties of Metal Powders and their Testing; Methods of Metal Powder Production; Precompaction Powder Handling; Compaction Processes; Densification Mechanisms; Sintering Theory; Liquid Phase and Activated Sintering; Sintering Atmospheres and Furnaces; Full Density Processing; Finishing Operations; Compact Characterization.

MLZ431 (Eng) Alloys 3+0 4.0

Theory of Alloying: Why and How Alloying is Done?; Phase Transformations in Alloys: Aging, Martensitic Transformation, Formation of Secondary Phases (Intermetallics and Solid Solution Systems); The Effect of Deformation and Heat Treatment; Steels; High Temperature Alloys; Light Alloys (Al, Mg, Ti Alloys); Special Alloys (Invars, Magnetic Alloys and etc.) Theory of Alloying: Why and How Alloying is Done?; Phase Transformations in Alloys: Aging, Martensitic Transformation, Formation of Secondary Phases (Intermetallics and Solid Solution Systems); The Effect of Deformation and Heat Treatment; Steels; High Temperature Alloys; Light Alloys (Al, Mg, Ti Alloys); Special Alloys (Invars, Magnetic Alloys and etc.)

MLZ433 (Eng) Thin Film Technology 3+0 4.0

Introduction to Physics of Thin Film and Overview; Growth and Film Formation; Vacuum and Kinetic Theory of Gases; Evaporation; Sputter Deposition; General Process; Specific methods; Film Characterization Techniques; Optical Electrical Magnetic and Mechanical Properties of Thin Films. Introduction to Physics of Thin Film and Overview; Growth and Film Formation; Vacuum and Kinetic Theory of Gases; Evaporation; Sputter Deposition; General Process; Specific methods; Film Characterization Techniques; Optical Electrical Magnetic and Mechanical Properties of Thin Films.

MLZ434 (Eng) Aviation Materials 3+0 4.0

Common Aviation Materials and Alloys: Stainless Steels; Super Alloys, Titanium Alloys, Aluminium Alloys, Composite Materials; Material Properties under Tensile, Fatigue and Creep; Raw Material Production Methods and Effect of Production Methods on Material Properties: Ingot Production, Casting, Forging, Material Production Processes: Welding, Brazing, Form Operations, Heat Treatment, Material Testing: Testing at Room Temperature, Testing at High Temperature, Wear and Corrosion; Quality Control: Non-destructive and Destructive Testing Methods, Quality Insurance Systems. Common Aviation Materials and Alloys: Stainless Steels; Super Alloys, Titanium Alloys, Aluminium Alloys, Composite Materials; Material Properties under Tensile, Fatigue and Creep; Raw Material Production Methods and Effect of Production Methods on Material Properties: Ingot Production, Casting, Forging, Material Production Processes: Welding, Brazing, Form Operations, Heat Treatment, Material Testing: Testing at Room Temperature, Testing at High Temperature, Wear and Corrosion; Quality Control: Non-destructive and Destructive Testing Methods, Quality Insurance Systems.

- MLZ444 (Eng) Welding Technologies** **3+0 4.0**
 Welding and Soldering; Micro structural Evolution of Metals During Welding and Soldering; Power Sources in Welding; Electrical Concepts in Welding (AC and DC Sources; Constant Current and Constant Voltage and Electrical Stick Out); Effects Polarity of Work Piece and Electrode; Consumable and Non-Consumable Electrodes; Choosing Electrodes for Specific Welding Operations; Welding Methods: Diffusion welding; Spot Welding; Shielded Metal Arc Welding; Gas-Tungsten Arc Welding; Gas Metal Arc Welding; Flux-Cored Arc Welding; Submerged Arc Welding; Electro slag Welding; E-Beam and Laser Welding; Welding of Reactive Metals Al and Mg; Soldering Alloys; Case Studies Involving Soldering and Welding. Welding and Soldering; Micro structural Evolution of Metals During Welding and Soldering; Power Sources in Welding; Electrical Concepts in Welding (AC and DC Sources; Constant Current and Constant Voltage and Electrical Stick Out); Effects Polarity of Work Piece and Electrode; Consumable and Non-Consumable Electrodes; Choosing Electrodes for Specific Welding Operations; Welding Methods: Diffusion welding; Spot Welding; Shielded Metal Arc Welding; Gas-Tungsten Arc Welding; Gas Metal Arc Welding; Flux-Cored Arc Welding; Submerged Arc Welding; Electro slag Welding; E-Beam and Laser Welding; Welding of Reactive Metals Al and Mg; Soldering Alloys; Case Studies Involving Soldering and Welding.
- MLZ445 (Eng) Phase Transformations in Metals and Alloys** **3+0 4.0**
 Phenomenological and Atomistic Approaches in Solid State Diffusion; Diffusion Transformations in Solids; Free energy-composition diagrams in precipitation; Precipitation transformations; Solid-state nucleation; precipitation kinetics; Eutectoid Transformation and Discontinuous Precipitation. Diffusionless Transformations: Martensite crystallography; thermodynamics and types of marten sites; Bainite transformation. Phenomenological and Atomistic Approaches in Solid State Diffusion; Diffusion Transformations in Solids; Free energy-composition diagrams in precipitation; Precipitation transformations; Solid-state nucleation; precipitation kinetics; Eutectoid Transformation and Discontinuous Precipitation. Diffusionless Transformations: Martensite crystallography; thermodynamics and types of marten sites; Bainite transformation.
- MLZ447 (Eng) Materials Processing Laboratory II** **0+2 3.0**
 Physical Test, Physical Properties Test of Metals: Strain Gages; Charpy Test; Tensile Test; High Temperature Tensile Test; Bending Test; Impact Test; Hardness Test; Compression Test; Creep Test; Fatigue Test; Fracture Toughness Test, Pig-iron, Stainless Steel, Copper-Brass Samples Tests; Non-destructive Test Methods: Ultraviolet and X-ray non-destructive test methods, Loops Experiment.
- MLZ449 (Eng) Innovation and Entrepreneurship** **1+0 1.0**
 Creativity and Innovation Process; Understanding Entrepreneurship; Definition, Role, Evulation; Entrepreneurial Journey: Challenges and oppotunities, Getting ready; Business Model Development; Developing and positioning a business concept; Feasibility Analysis; Market Analysis: Industry lifecycle, Target market characterisation, Analysis of product risks and benefits; Building a Business Plan: Concept, Structure, Presentation; Financial Opportunities for Entrepreneurship; Entrepreneurial Experiences
- MLZ450 (Eng) Computational Materials Science** **3+0 4.0**
 Importance of the Computational Materials Science; Application Areas of Computational Materials Science; Structural Properties of Materials; Electronic Properties of Materials; Basic Quantum Mechanics; Schrödinger Equation; Molecular Dynamics and Simulations.
- MLZ453 (Eng) Advanced Materials and Composites** **2+0 3.0**
 Introduction to Advanced Materials and Composites; Production Methods of Advanced Ceramics and Composites; Properties and Applications of Advanced Ceramics and Composites; Production Methods of Metal Matrix Composites; Properties and Applications of Metal Matrix Composites; Production Methods of Polymer Matrix Composites; Properties and Applications of Polymer Matrix Composites; Testing; Interfaces; Fibers, Whiskers and Nanotubes.
- MLZ454 (Eng) Smart Materials** **3+0 4.0**
 Shape Memory Alloys; Piezoelectric Materials; Electro-active Polymers; Sensors and Actuators; Martensitic Phase Transformation; Shape Memory Effect; Super elasticity; Crystal Structure; Direct and Indirect Piezoelectric Effect; Energy Storage; Seismic Isolation; Deformable Structures.
- MLZ455 (Eng) Heat Treatment** **2+0 3.0**
 Heat Treatments Applied to Metallic Materials, Definitin of Heat Treatment, Low Temprature Heat Treatment Process, High Temprature Heat Treatment Process; Annealing; Homogenization; Solution Treatment-Quenching-Ageing and Stabilization; Heat Treatment of Steel; Full Annealing; Normalizing; Spheroidizing; Stres-Relief Annealing; Hardening; Tempering; Isothermal Ageing; Martempering; Austempering.
- MLZ456 (Eng) Physical Properties of Nanomaterials** **3+0 4.0**

Importance of Materials Science; Nanomaterials; Application Areas of Nanomaterials; Physical and Structural Properties of Nanomaterials; Simulation techniques for Nanomaterials; Basic Quantum Physics and Mechanics; Applications of Computational Material Science and Nanomaterials; Small Sized Nanomaterials based on C, Si and Ge.

MLZ457 (Eng) Manufacturing with Materials 2+0 3.0

The Role of Manufacturing in Global Economics, Manufacturing Aids and Manufacturing Break-Even Analysis; Understand Manufacturing Fundamentals; Manufacturing of Different Materials; Traditional Manufacturing Methods: Extrusion, Injection moulding; Tape Casting; Novel Manufacturing methods: Additive manufacturing; Micro and Nano Machining; Joining Methods: Brazing, Mechanical bolting.

MLZ459 (Eng) Degradation of Engineering Materials 2+0 3.0

Degradation Economics; Electrochemical Principles of Corrosion; Review of Thermodynamic Approach in View of Corrosion Tendency; Polarization and its Application to Corrosion Rates; Passivity; Types of Corrosion Damage; Corrosion in Various Environments; Principles of Corrosion Control; Design; Material Selection; Surface Coating; Treatment of Environment; Anodic and Cathodic Protection; Oxidation and Tarnish of Metals; High Temperature Oxidation; Degradation of Ceramics and Plastics; Corrosion of Composite Materials.

MLZ460 (Eng) Materials Selection and Design 2+2 5.0

Materials Selection and Design: Design; Learning of Design; Types of Design, Technical Systems, Design Process, Design Tools and Material Property Data; Engineering Materials, Smart Materials, Learning of CEs-Edupack Package Program, Metals, Ceramics, Polymers, Composites; Materials Selection Charts; Selection of Material and Shape; Process Selection Charts; Term Project.

MLZ461 (Eng) Glass Technology 2+0 3.0

Introduction to Glass Science; Different Types of Glasses: Pure silica glass, Alkali-silicate glasses, Soda-lime-silica glasses, Lead based glasses, Borosilicate glasses, Alumina-silicate glasses, Phosphate glasses, Halogen based glasses, Chalcogenide glasses; Theories for Glass Formation; Raw Materials and Their Properties; Glass Batch Calculations; Physical and Chemical Properties of Glass; Optical Properties of Glass; Chemical Durability of Glass; Glass Formation Techniques; Heat Treatment of Glass; Applications of Glass.

MLZ462 (Eng) Applications in Materials Engineering 2+0 4.0

Establishment of Application Problems in Materials Science and Engineering; Broad Literature and Textbook Survey of Selected Problems in the Questionnaire; Oral Presentation of Answers to Responsible Lecturers; Discussion of the Answers with the Lecturers in the Light of Answer Sheets.

MLZ463 (Eng) Project Preparation for Material Science and Engineering 1+2 3.0

Preliminary Research on the Topic Chosen under the Guidance of an Advisor; A Broad Literature Survey about the Topic; Preliminary Studies for Setting-up Laboratory Experiments; Design of Experimental Set-ups; Acquisition of Data for Theoretical and/or Modeling Studies; Determining Steps of the Study; Reporting the Results.

MLZ464 (Eng) Project Practice for Material Science and Engineering 2+4 6.0

Theoretical and/or Experimental Works Related to the Chosen Topic Under the Guidance of an Advisor; Reporting the Results; Presentation of the Results as a Poster; Oral Presentation Before a Jury, Skill of Presentation by English, Skill of Indicate of Results, Skill of Answer for Jury Questions, Skill of Selection and Design of Project, Skill of Evolution of Results by Graphics.

MLZ465 (Eng) Machining Technology of Metals 2+0 3.0

Definition and Explanation of Main Metal Cutting Operations (Turning, Drilling And Milling); Chip Formation Fundamentals and Mechanics, Built-Up Edge, Tool-Chip Interface, Cutting Forces and Stresses; Calculations of Machining Parameters, Material Removal Rate, Machining Time etc.; Cutting Tool Geometry and Its Effects on Cutting Process; Cutting Tool Wear Mechanisms at Low and High Temperatures; Structure, Property and Performance Relationship of The High Speed Steels and Cemented Carbides Tools; Structure, Property and Performance Relationship of the Ceramics and Ultra-Hard Cutting Tools; Machining of Superalloys; Titanium Alloys; Steels and Cast Irons.

MLZ466 (Eng) Enamels 2+0 3.0

Identification of Enamel; Their Advantages and Disadvantages; Chemical Composition; Commonly Known Enamel Systems; Suitable Metallic Substrates; Enamel Productions; Defects; Enamel Based Defects, Substrate Based Defects; Elimination of Defects; Characterization of Enamelled Products; Enamel Application Fields, Why We Use Enamels from Metals and How to Cover from Metal for Corrosion Behaviour.

MLZ467 (Eng) Particle Size Control Mechanism 2+0 3.0

Fundamentals of Processing; Particle Sizing Process; Particle Sizing Techniques; Raw Material Preparation Criteria; Particle Size Reduction and Aim of Size; Crushing and Grinding Systems; Choosing a Suitable Process in View of Grinding and Bond Index Criteria; Classification of Particle Sizes; Mineral Processing and Applications; Submicron Grinding and Size Control; High Technology Grinding Processes.

MLZ468 (Eng) Rubber and Rubber Technology **2+0 3.0**

Introduction; Fundamental Concepts: Polymers, Morphology, Thermoplastics, Elastomers, Thermosets; Brief History of Rubber; Types of Rubber: Golden rules, Natural rubber, Synthetic rubbers; Properties and Testing of Rubber: Tests on compound, Tests on vulcanizate; Compounding Materials: Recipe, Dispersion, Fillers, Process oils, Vulcanization and vulcanization chemicals, Antidegradants, Processing aids; Processing and Associated Equipment: Mixing, Extrusion, Moulding, Finishing operations; Engineering with Rubber; Rubber Products: Tyres, Belts, Rubber-to-metal parts, Sealing elements, Profiles, Hoses, Footwear, Wire and cable.

MLZ469 (Eng) Alloys **2+0 3.0**

Al Alloys: Classification and general characteristics, Ageability and its effect on properties of Al alloys, The effects of alloying additions, Secondary phases, Processing history on microstructure and mechanical performance; Cu Alloys: Classification and general characteristics, Metallography, The effects of alloying additions, Secondary phases, Processing history on microstructure and mechanical performance; Ti Alloys: Classification and general characteristics, The effects of alloying additions, Grain shape and size, Processing history on microstructure and mechanical performance; Shape Memory Alloys: Definition and origin of shape memory and superelasticity.

MLZ470 (Eng) Cement and Concrete **2+0 3.0**

Definition of Cement; Cement Production; Furnace Reactions; Composition of Clinker; Effects of Cement Production Process Parameters on the Properties of Final Product; Hydration; Hardening and Its Certain Crystal Phases and Their Interactions with Each Other; Standard Cement Experiments; General Properties of Cement; Definition of Concrete; Aggregates for Concrete; General Properties of Concrete; Special Concretes.

MLZ471 (Eng) Nanomaterials and Nanotechnology **2+0 3.0**

Introduction to Nanomaterials and Nanotechnology; History of Nanotechnology; Examples of Nanotechnology from the Nature; Nanomaterials Synthesis; Solution-based Synthesis Methods; Carbon Nanotube Growth Techniques; Nanofabrication; Top-Down and Bottom-Up Approaches; Tools for Characterization of Nanomaterials; Physical and Mechanical Properties of Nanomaterials; Size Dependent Thermal, Mechanical, Optical, Electrical and Magnetic Properties; Applications of Nanomaterials; Future of Nanomaterials; Opportunities and Challenges.

MLZ472 (Eng) Biomaterials **2+0 3.0**

Introduction to Biomaterials; Bioceramics: Ceramic implant materials, Alumina and zirconia, Calcium phosphate, Hydroxyapatite, Glass-ceramics; Biometal; Metallic Implant Materials: Stainless steels, Ti and Ti-based alloys, Dental metals, Dental amalgam, Nickel-titanium alloys; Biopolymer; Polymeric Implant Materials; Polyamides, Polyethylene, Polypropylene, Polyacrylates, Fluorocarbon Polymers; Composite Biomaterials: Mechanics of composites, Applications of composite biomaterials; Type of Tissues; Tissue Response to Implants; Soft Tissue Replacement; Hard Tissue Replacement.

MLZ473 (Eng) Carbon Nanomaterials **2+0 3.0**

Carbon Element; Carbon Allotropes in Nanoscale; Role of Carbon Nanomaterials in Evolving of Nanotechnology; An Overview of Nanoparticle Synthesis; Structure, Properties, Production Methods and Applications of Carbon Nanomaterials: Fullerene, Carbon Nanotube, Carbon Nanofiber, Graphene and Nanodiamond; Comparison of Graphene with Other Two-Dimensional Materials.

MLZ474 (Eng) Aviation Materials **2+0 3.0**

Common Aviation Materials and Alloys: Stainless steels; Super Alloys, Titanium Alloys, Aluminium Alloys, Composite Materials; Material Properties under Tensile, Fatigue and Creep; Raw Material Production Methods and Effect of Production Methods on Material Properties: Ingot Production, Casting, Forging, Material production processes: Welding, Brazing, Form operations, Heat treatment, Material testing: Testing at room temperature, Testing at high temperature, Wear and corrosion; Quality control: Non-destructive and destructive testing methods, Quality insurance systems.

MLZ475 (Eng) Polymer Matrix Composites **2+0 3.0**

General Aspects of Composite Materials: Fibers and fiber architecture; Matrices; Elastic Deformation of Long-Fiber Composites; Laminates and Their Elastic Behavior; Stress and Strain in Short Fiber Composites; Characterization of Interface Region Between Matrix and Fiber; Introduction to Interface Formation Mechanisms: Measurement of bonding strength; Strength and Toughness of Polymer Matrix Composites; Introduction to Processing Technologies for Polymer Matrix Composites: Hand Lay-Up; Pre-Preg; SMC (Sheet Molding Compound); RTM (Resin Transfer Molding); VARTM (Vacuum Assisted Resin Transfer Molding); Poltrusion; Filament Winding; Recent Applications of Polymer Matrix Composites.

MLZ476 (Eng) Engineering Materials for Armour Applications **2+0 3.0**
Ballistics and Classification: Internal ballistics, Transition ballistics, External ballistics, Terminal ballistics; Types of Threats and Mechanisms; Mechanical Behavior of Bullets and Rockets; Armor Types: Ceramic armors, Metallic armors, Polymer based armors, Auxiliary materials, B4C-Al composite; Alumina (Al₂O₃); Mullite; Cordierite; Silicon Carbide (SiC); TiB₂-Ni Composite; Kevlar; Active and Reactive Armors; Armor Design.

MLZ477 (Eng) Microscopy in Practice **2+0 3.0**
Light-Solid and Electron-Solid Interactions and Their Results; Offering a Solution to the Problem Encountered in the Material; Sample Preparation to Realize the Solution; Problem Solving with Light Microscopy Techniques; Microstructural Problem Solving in Scanning Electron Microscopy; Problem Solving by Chemical Analysis in Scanning Electron Microscopy; Problem Solving by Phase Analysis in Scanning Electron Microscopy; Problem Solving by Combining Other Techniques with Microscopic Techniques; Problem Solving with Transmission Electron Microscopy (TEM) Techniques and Scanning Transmission Electron Microscopy (STEM) Techniques; Case Study: Metallic and Ceramic Base Mat..

MLZ478 (Eng) Mathematical Relations in Powder Processing **2+0 3.0**
Particle Size Distribution Models; Stoke's Law; Langmuir Theory; Brunaueremmetteller (BET); Equations for Compaction; Bimodal Powder Packing; Washburn Equation; Random-Walk Diffusion; Fick's First and Second Law; Herring Scaling Law; Laplace Equation; Densification and Grain Growth Mechanisms; Combined Stage Sintering Model; Creep Models; Stereological Analysis; Weibull Distribution.

MLZ480 (Eng) Tile and Brick **2+0 3.0**
Definition of Structural Ceramics, Its Importance and classification; Raw Materials: Storage of raw materials, Preparation of raw materials; Processing of Structural Ceramics: Shaping, Surface treatment, Cutting, Drying, Firing, Final product finishing, Test analysis on structural ceramics; Quality Control Standarts of Structural Ceramics; Structural Ceramics Industry of Turkiye.

MLZ482 (Eng) Refractories **2+0 3.0**
What is a Refractory Material?; Classification by Fabrication Methods; Shaping of Refractories; Classification of Refractories: Chemical composition, Raw and synthetic, Acidic, Basic and neutral; Flowcharts: Pressing, Slip casting; Raw Materials of Refractories; How Refractories are Made?; Fabrication Techniques; Test Methods; Properties of Refractories; Refractoriness; Refractoriness Under Load; Creep; Thermal Shock Behaviour; Slag Resistance; Mechanical Properties; Thermal Stress/Shock Parameters; Solutions of Example Problems; Types of Refractories; Refractories in Cement Rotary Kilns; Use of Refractories in the Iron and Steel Industry; Glass Melting Refractories.

MLZ484 (Eng) Glass Ceramics **2+0 3.0**
Introduction to Glass Ceramics; samples of Glass Ceramic Systems; Preparation of Glass Ceramic Materials; Types of Simple Phase Transformation in Glass Systems; Crystallisation Mechanisms; Bulk Crystallisation in Simple Systems; General Properties of Glass Ceramics and Comparisons with Conventionally Prepared Glass Ceramics; Properties of Commercially Available Glass Ceramics and Their Application.

MLZ486 (Eng) Strengthening Mechanisms in Materials **2+0 3.0**
Classification of Materials; Mechanical Properties/Behaviours of Metals; Elastic/Plastic Deformation; Dislocations; Mechanical Properties/Behaviours of Ceramics; Mechanical Properties/Behaviours of Polymers; Viscoelastic Deformation; Mechanical Properties/Behaviours of Composites; Fundamentals/Principles of Fracture Mechanics; Mechanisms of Strengthening in Metals; Recovery, Recrystallization and Grain Growth; Toughening Mechanisms in Ceramics; Mechanisms of Deformation and for Strengthening of Polymers; Toughening Mechanisms in Composites; Thermo-Mechanical Properties of Materials; Thermal Stress/Shock Parameters; Thermal Properties/Behaviours of Materials.

MLZ488 (Eng) Technical Glasses **2+0 3.0**
The Description of a Technical Glass; Common Technical Glass Systems, Chemical Compositions; Commercially Available Technical Glasses: Laboratory glasses, Bio glasses, Metallic glasses, Chalcogenide glasses, Te-based glasses, Smart glasses, Automotive industry's glasses, Glasses used in aviation, Glass microspheres; Technical Properties; Production Methods; Application Fields.

MTR301 (Eng) Introduction to Mechatronics **3+0 5.0**
Introduction, Engineering and Mechatronics Engineering, Mechatronics Engineering Design; Sensor and Transducers; Digital Systems and Digital Logics, Signal Processing in Mechatronics Systems; Phonematic Actuation Systems; Hydraulic Actuation Systems; Mechanical Actuation Systems; Electrical Actuation Systems; Mechatronics System Modelling; PLC Controllers and Microprocessors; Mechatronics Systems Software.

MTR401 (Eng) Mechatronics **2+2 5.0**

Introduction to Mechatronics, The concept of mechatronic system, Introduction to system components and classifications; Sensors and Transducers, Introduction to sensors and transducers used in mechatronic systems, Selection of useful sensor and transducers; Data Acquisition Systems; Signal Conditioning; Actuators; System Modeling-Mechanics; Electric-Electronic System Modeling; Controller Design; Microprocessors and PLC.

MUH151 Introduction to Accounting 3+0 4.5

Concepts of Business and Accounting; Financial Transactions; Balance of Assets-Liabilities; Balance Sheet and Income Statement; Accounts: Concept of account, Types of accounts, Account chart; Document and Books; Accounting Process; Follow up Goods Transactions: Inventories and transactions of the purchase and sale of goods, Periodic inventory system, Perpetual inventory system; Liquid Assets: Cash, Banks, Checkups; Marketable Securities: Share certificates, Bonds; Receivables: Trade receivable, Other receivable; Long Term Assets; Liabilities; Shareholders Equity; Transactions of Income and Expenses; End of Period Transactions; Preparing Financial Statements and Closing Transactions. Concepts of Business and Accounting; Financial Transactions; Balance of Assets-Liabilities; Balance Sheet and Income Statement; Accounts: Concept of account, Types of accounts, Account chart; Document and Books; Accounting Process; Follow up Goods Transactions: Inventories and transactions of the purchase and sale of goods, Periodic inventory system, Perpetual inventory system; Liquid Assets: Cash, Banks, Checkups; Marketable Securities: Share certificates, Bonds; Receivables: Trade receivable, Other receivable; Long Term Assets; Liabilities; Shareholders Equity; Transactions of Income and Expenses; End of Period Transactions; Preparing Financial Statements and Closing Transactions.

MUH151 (Eng) Introduction to Accounting 3+0 4.5

Concepts of Business and Accounting; Financial Transactions; Balance of Assets-Liabilities; Balance Sheet and Income Statement; Accounts: Concept of account, Types of accounts, Account chart; Document and Books; Accounting Process; Follow up Goods Transactions: Inventories and transactions of the purchase and sale of goods, Periodic inventory system, Perpetual inventory system; Liquid Assets: Cash, Banks, Checkups; Marketable Securities: Share certificates, Bonds; Receivables: Trade receivable, Other receivable; Long Term Assets; Liabilities; Shareholders Equity; Transactions of Income and Expenses; End of Period Transactions; Preparing Financial Statements and Closing Transactions. Concepts of Business and Accounting; Financial Transactions; Balance of Assets-Liabilities; Balance Sheet and Income Statement; Accounts: Concept of account, Types of accounts, Account chart; Document and Books; Accounting Process; Follow up Goods Transactions: Inventories and transactions of the purchase and sale of goods, Periodic inventory system, Perpetual inventory system; Liquid Assets: Cash, Banks, Checkups; Marketable Securities: Share certificates, Bonds; Receivables: Trade receivable, Other receivable; Long Term Assets; Liabilities; Shareholders Equity; Transactions of Income and Expenses; End of Period Transactions; Preparing Financial Statements and Closing Transactions.

MUH210 General and Cost Accounting 3+0 3.0

Company and Accounting; Financial qualified operations, Balance of assets-resource, Balancing income, Accounts: Concept of account, Types of accounts, Planning of account(s); Documents and books; Process of account; Intermittent Inventory method, Perpetual Inventory method; Income and Expenditure Process; End of Period process; Arrangement of Financial Statement and Closing Process; Cost Accounting and Main concepts; Uniform Accounting System; Type of cost: Standard, Variable cost system; Classification of Costs; Material costs; Labor costs and performance evaluation tool; Manufacturing overhead costs; Cost Centers and cost allocations; Job cost system, Process cost system; Cost in joint production.

MÜH302 Interdisciplinary Applications 1+2 4.5

The Notion of Interdisciplinary Study; Topic Selection; Conduction of an Extensive Literature Survey about the Topic; Discussion of the Topics Among Students from Different Disciplines; Conclusion of the Study by Overseeing Up-to-Date Economical and Social Criteria and Following Ethical Standards; Preparation of a Poster Presentation Incorporating the Steps and Results of the Study; Presentation of the Study Before a Jury or an Audience. The Notion of Interdisciplinary Study; Topic Selection; Conduction of an Extensive Literature Survey about the Topic; Discussion of the Topics Among Students from Different Disciplines; Conclusion of the Study by Overseeing Up-to-Date Economical and Social Criteria and Following Ethical Standards; Preparation of a Poster Presentation Incorporating the Steps and Results of the Study; Presentation of the Study Before a Jury or an Audience.

**MÜH302 Interdisciplinary Applications 1+2 4.5
(Eng)**

The Notion of Interdisciplinary Study; Topic Selection; Conduction of an Extensive Literature Survey about the Topic; Discussion of the Topics Among Students from Different Disciplines; Conclusion of the Study by Overseeing Up-to-Date Economical and Social Criteria and Following Ethical Standards; Preparation of a Poster Presentation Incorporating the Steps and Results of the Study; Presentation of the Study Before a Jury or an Audience. The Notion of Interdisciplinary Study; Topic Selection; Conduction of an Extensive Literature Survey about the Topic; Discussion of the Topics Among Students from Different Disciplines; Conclusion of the Study by Overseeing Up-to-Date Economical and Social Criteria and Following Ethical Standards; Preparation of a Poster Presentation Incorporating the Steps and Results of the Study; Presentation of the Study Before a Jury or an Audience.

MÜH402 Engineering Ethics 2+0 3.0

A Brief History of Ethics; Introduction to Ethical Conflicts; Values and Value Systems/History of engineering profession; Computer and Hacker Ethics/Business Ethics; Incident at Morales; Environmental Ethics/Climate Change Ethics; Case studies for engineering ethics.A Brief History of Ethics; Introduction to Ethical Conflicts; Values and Value Systems/History of engineering profession; Computer and Hacker Ethics/Business Ethics; Incident at Morales; Environmental Ethics/Climate Change Ethics; Case studies for engineering ethics.

MÜH402 (Eng) Engineering Ethics 2+0 3.0

A Brief History of Ethics; Introduction to Ethical Conflicts; Values and Value Systems/History of engineering profession; Computer and Hacker Ethics/Business Ethics; Incident at Morales; Environmental Ethics/Climate Change Ethics; Case studies for engineering ethics.A Brief History of Ethics; Introduction to Ethical Conflicts; Values and Value Systems/History of engineering profession; Computer and Hacker Ethics/Business Ethics; Incident at Morales; Environmental Ethics/Climate Change Ethics; Case studies for engineering ethics.

MÜH404 Innovation Management 3+0 3.0

Innovation Concept: History and Evolution of Knowledge, World of Innovation, Defining Innovation Models; Innovation and Creativity: Creativity Concept, Fostering Creativity in Organizations, Factors Fostering Creativity, Creativity to Innovation, Tools for Creativity; Innovation in Information Age: Innovation Process, Innovation Types, Barriers to Innovation, Recent Innovation Trends, Analyzing Innovation, Conditions of Information Age, Innovative Thinking, Breakthrough Innovation Process, Innovative Idea Generation, Encouraging Innovation in the Organization, Building an Innovative Organization, Measures of Innovation: Recent Measures of Innovation, Process Based Measures of Innovation; Institutionalizing Innovation: Innovation in Service, Protecting the Innovation, Commercializing the Innovation, Managing Campus-Based Innovations, Managing Innovative Activities.Innovation Concept: History and Evolution of Knowledge, World of Innovation, Defining Innovation Models; Innovation and Creativity: Creativity Concept, Fostering Creativity in Organizations, Factors Fostering Creativity, Creativity to Innovation, Tools for Creativity; Innovation in Information Age: Innovation Process, Innovation Types, Barriers to Innovation, Recent Innovation Trends, Analyzing Innovation, Conditions of Information Age, Innovative Thinking, Breakthrough Innovation Process, Innovative Idea Generation, Encouraging Innovation in the Organization, Building an Innovative Organization, Measures of Innovation: Recent Measures of Innovation, Process Based Measures of Innovation; Institutionalizing Innovation: Innovation in Service, Protecting the Innovation, Commercializing the Innovation, Managing Campus-Based Innovations, Managing Innovative Activities.

MÜH404 (Eng) Innovation Management 3+0 3.0

Innovation Concept: History and Evolution of Knowledge, World of Innovation, Defining Innovation Models; Innovation and Creativity: Creativity Concept, Fostering Creativity in Organizations, Factors Fostering Creativity, Creativity to Innovation, Tools for Creativity; Innovation in Information Age: Innovation Process, Innovation Types, Barriers to Innovation, Recent Innovation Trends, Analyzing Innovation, Conditions of Information Age, Innovative Thinking, Breakthrough Innovation Process, Innovative Idea Generation, Encouraging Innovation in the Organization, Building an Innovative Organization, Measures of Innovation: Recent Measures of Innovation, Process Based Measures of Innovation; Institutionalizing Innovation: Innovation in Service, Protecting the Innovation, Commercializing the Innovation, Managing Campus-Based Innovations, Managing Innovative Activities.Innovation Concept: History and Evolution of Knowledge, World of Innovation, Defining Innovation Models; Innovation and Creativity: Creativity Concept, Fostering Creativity in Organizations, Factors Fostering Creativity, Creativity to Innovation, Tools for Creativity; Innovation in Information Age: Innovation Process, Innovation Types, Barriers to Innovation, Recent Innovation Trends, Analyzing Innovation, Conditions of Information Age, Innovative Thinking, Breakthrough Innovation Process, Innovative Idea Generation, Encouraging Innovation in the Organization, Building an Innovative Organization, Measures of Innovation: Recent Measures of Innovation, Process Based Measures of Innovation; Institutionalizing Innovation: Innovation in Service, Protecting the Innovation, Commercializing the Innovation, Managing Campus-Based Innovations, Managing Innovative Activities.

MÜZ101 Evolution of Music 2+0 3.0

History of Music: Antique period, Middle Ages, Renaissance, Baroque, Music in the 17th and 19th centuries; Music in the 20th Century: Regionalism, Nationalism, Universality; Cultural Mosaic of Anatolian Music; Place of Turkish Music in the International Arena; Developing Appreciation of Music from Different Periods.History of Music: Antique period, Middle Ages, Renaissance, Baroque, Music in the 17th and 19th centuries; Music in the 20th Century: Regionalism, Nationalism, Universality; Cultural Mosaic of Anatolian Music; Place of Turkish Music in the International Arena; Developing Appreciation of Music from Different Periods.

MÜZ151 Short History of Music 2+0 3.0

Mile Stones in the History of Music; Music of the Antique Period; Music of Far East; Music of Anatolia; Music of the Middle Ages: Gregorian Chants; Music of Renaissance: Bach and Handel; Music of the Classical Age; Pianoforte in the Classical Age; Romantic Age; Nationalist Movement; Contemporary Music; Nationalism and Universality.

MÜZ155 Turkish Folk Music 2+0 2.0

Folk songs from different Regions of Turkey are Taught; Aegean Region Zeybek Folk Songs: Eklemedir koca konak, Ah bir ateş ver, Çökertme, Kütahya'nın pınarları, Çemberinde gül oya; Kars Region Azerbaijani Folk Songs: Bu gala daşlı gala,

Yollarına baka baka, Dağlar gızı Reyhan, Ayrılık, Dut ağacı boyunca; Central Anatolian Region Folk Songs: Seherde bir bağa girdim, Uzun ince bir yoldayım, Güzelliğin on para etmez, Mihriban ve Acem kızı; Southeastern Anatolian Region; Urfa and Diyarbakır Folk Songs: Allı turnam, Urfanın etrafı, Mardin kapısından atlayamadım, Fırat türküsü, Evlerinin önu kuyu; Blacksea Region; Trabzon, Rize, Artvin Folk Songs: Maçka yolları taşı, Ben giderim Batuma, Dere geliyor dere.

MÜZ157 Traditional Turkish Art Music 2+0 2.0

Description of Traditional Art Music: Basic concepts, Characteristics, Types, Notes, Instruments; The Mode System of Traditional Turkish Art Music; The Rhythmic Pattern of Traditional Turkish Art Music; Samples from Different Modes; Samples from Different Rhythmic Patterns.

NÜM202 Linear Algebra and Numerical Methods 4+0 4.5

Matrices and Determinants: Definition of Matrix and its applications; Determinants and Inverse Matrix; Solutions of Nonlinear Systems of Equations; Graphical Method, Interval Halving Method, Interpolation and Newton-Raphson method; Interpolation: Various methods of interpolation; Curve Fitting; Least Squares Method; Numerical Differentiation: Derivation of 1st ,2nd and 3rd derivatives numerically; Numerical Integration: Trapezoidal rule of integration; Simpson's Method; Ordinary Differential Equations; Runge-Kutta Method; Euler Method; Taylor's Series Method; Numerical Solutions of Partial Differential Equations: Parabolic, Elliptic and Hyperbolic Equations. Matrices and Determinants: Definition of Matrix and its applications; Determinants and Inverse Matrix; Solutions of Nonlinear Systems of Equations; Graphical Method, Interval Halving Method, Interpolation and Newton-Raphson method; Interpolation: Various methods of interpolation; Curve Fitting; Least Squares Method; Numerical Differentiation: Derivation of 1st ,2nd and 3rd derivatives numerically; Numerical Integration: Trapezoidal rule of integration; Simpson's Method; Ordinary Differential Equations; Runge-Kutta Method; Euler Method; Taylor's Series Method; Numerical Solutions of Partial Differential Equations: Parabolic, Elliptic and Hyperbolic Equations.

NÜM202 (Eng) Linear Algebra and Numerical Methods 4+0 4.5

Matrices and Determinants: Definition of Matrix and its applications; Determinants and Inverse Matrix; Solutions of Nonlinear Systems of Equations; Graphical Method, Interval Halving Method, Interpolation and Newton-Raphson method; Interpolation: Various methods of interpolation; Curve Fitting; Least Squares Method; Numerical Differentiation: Derivation of 1st ,2nd and 3rd derivatives numerically; Numerical Integration: Trapezoidal rule of integration; Simpson's Method; Ordinary Differential Equations; Runge-Kutta Method; Euler Method; Taylor's Series Method; Numerical Solutions of Partial Differential Equations: Parabolic, Elliptic and Hyperbolic Equations. Matrices and Determinants: Definition of Matrix and its applications; Determinants and Inverse Matrix; Solutions of Nonlinear Systems of Equations; Graphical Method, Interval Halving Method, Interpolation and Newton-Raphson method; Interpolation: Various methods of interpolation; Curve Fitting; Least Squares Method; Numerical Differentiation: Derivation of 1st ,2nd and 3rd derivatives numerically; Numerical Integration: Trapezoidal rule of integration; Simpson's Method; Ordinary Differential Equations; Runge-Kutta Method; Euler Method; Taylor's Series Method; Numerical Solutions of Partial Differential Equations: Parabolic, Elliptic and Hyperbolic Equations.

NÜM301 (Eng) Numerical Methods 3+0 3.5

Numerical Solutions of Nonlinear Systems of Equations: Graphical method, Interval halving method, Newton-Raphson methods; Interpolation: Forward, Backward and Central interpolation; Numerical Integration: Trapezoidal Rule of Integration and Simpson's Rule; Numerical Differentiation: Undetermined coefficients method; Numerical Solution of Ordinary Differential Equations: Taylor series method, Runge-Kutta method, Euler methods; Curve Fitting: Method of least squares. Numerical Solutions of Nonlinear Systems of Equations: Graphical method, Interval halving method, Newton-Raphson methods; Interpolation: Forward, Backward and Central interpolation; Numerical Integration: Trapezoidal Rule of Integration and Simpson's Rule; Numerical Differentiation: Undetermined coefficients method; Numerical Solution of Ordinary Differential Equations: Taylor series method, Runge-Kutta method, Euler methods; Curve Fitting: Method of least squares.

PSİ102 Psychology 3+0 3.5

What is Psychology?: Theoretical developments, Major Sub-Disciplines and methodology; Growth and Development; Motivation and Defense Mechanisms; Attention and Perception; Learning: Behavioral and cognitive approaches; Verbal Learning and Memory; Language and communication; Personality; Abnormal Behavior: Causes, Types and treatment. What is Psychology?: Theoretical developments, Major Sub-Disciplines and methodology; Growth and Development; Motivation and Defense Mechanisms; Attention and Perception; Learning: Behavioral and cognitive approaches; Verbal Learning and Memory; Language and communication; Personality; Abnormal Behavior: Causes, Types and treatment.

PSİ102 (Eng) Psychology 3+0 3.5

What is Psychology?: Theoretical developments, Major Sub-Disciplines and methodology; Growth and Development; Motivation and Defense Mechanisms; Attention and Perception; Learning: Behavioral and cognitive approaches; Verbal Learning and Memory; Language and communication; Personality; Abnormal Behavior: Causes, Types and treatment. What is Psychology?: Theoretical developments, Major Sub-Disciplines and methodology; Growth and Development; Motivation

and Defense Mechanisms; Attention and Perception; Learning: Behavioral and cognitive approaches; Verbal Learning and Memory; Language and communication; Personality; Abnormal Behavior: Causes, Types and treatment.

PSi301 Industrial Psychology 3+0 4.5

Introduction to Industrial Psychology: Job analysis, Uses of job analysis, Selection of employees; Performance Evaluation: Goals, Evaluation techniques, Employee training and development; Motivation and Job Gratification: Job gratification and its effects on the job, Resistance toward organizational change and solutions; Work Conditions and Accidents: Lighting, Noise, Humidity, Air pollution, Internal work conditions, Boredom and fatigue, Causes of Work Place Accidents; Stress; Causes of stress, Ways of overcoming stress. Introduction to Industrial Psychology: Job analysis, Uses of job analysis, Selection of employees; Performance Evaluation: Goals, Evaluation techniques, Employee training and development; Motivation and Job Gratification: Job gratification and its effects on the job, Resistance toward organizational change and solutions; Work Conditions and Accidents: Lighting, Noise, Humidity, Air pollution, Internal work conditions, Boredom and fatigue, Causes of Work Place Accidents; Stress; Causes of stress, Ways of overcoming stress.

PZL211 (Eng) Principles of Marketing 3+0 5.0

Marketing: Scope, Evolution of Marketing; Marketing Environment; Marketing Research and Marketing Information Systems; Market Segmentation; Selecting Target Markets; Elements of Marketing Mix: Product, Price, Distribution channels, Promotion; Organization of Marketing Activities; International Marketing. Marketing: Scope, Evolution of Marketing; Marketing Environment; Marketing Research and Marketing Information Systems; Market Segmentation; Selecting Target Markets; Elements of Marketing Mix: Product, Price, Distribution channels, Promotion; Organization of Marketing Activities.

PZL302 Marketing Management 3+0 4.5

Concept of Marketing; Evolution of Marketing; Functions of Marketing; Environmental Conditions of Marketing; Marketing Information Systems and Marketing Research; Market Concept; Market Segmentation and Target Market Selection; Customer Behavior in Industrial Markets; Product; Price; Distribution Channels and Physical Distribution; Sales Promotions; International Marketing. Concept of Marketing; Evolution of Marketing; Functions of Marketing; Environmental Conditions of Marketing; Marketing Information Systems and Marketing Research; Market Concept; Market Segmentation and Target Market Selection; Customer Behavior in Industrial Markets; Product; Price; Distribution Channels and Physical Distribution; Sales Promotions; International Marketing.

PZL302 (Eng) Marketing Management 3+0 4.5

Concept of Marketing; Evolution of Marketing; Functions of Marketing; Environmental Conditions of Marketing; Marketing Information Systems and Marketing Research; Market Concept; Market Segmentation and Target Market Selection; Customer Behavior in Industrial Markets; Product; Price; Distribution Channels and Physical Distribution; Sales Promotions; International Marketing. Concept of Marketing; Evolution of Marketing; Functions of Marketing; Environmental Conditions of Marketing; Marketing Information Systems and Marketing Research; Market Concept; Market Segmentation and Target Market Selection; Customer Behavior in Industrial Markets; Product; Price; Distribution Channels and Physical Distribution; Sales Promotions; International Marketing.

PZL310 (Eng) Marketing Management 3+0 5.0

Concept of Product; Product and service decisions, Branding strategy, New product development strategy, New product development process and management, Product life cycle strategies; Concept of Price: Major pricing strategies, New product pricing strategies, Product mix pricing strategies, Price adjustment strategies, Price changes, Marketing channels; Supply Chains and Value Delivery Network; Channel Behavior and Organization; Integrated Marketing Communications: Promotion mix, Communication mix, Advertising and public relations, Personal selling and sales promotion, Direct and online marketing. Concept of Product; Product and service decisions, Branding strategy, New product development strategy, New product development process and management, Product life cycle strategies; Concept of Price: Major pricing strategies, New product pricing strategies, Product mix pricing strategies, Price adjustment strategies, Price changes, Marketing channels; Supply Chains and Value Delivery Network; Channel Behavior and Organization; Integrated Marketing Communications: Promotion mix, Communication mix, Advertising and public relations, Personal selling and sales promotion, Direct and online marketing.

PZL452 (Eng) Revenue Management and Pricing 3+0 6.0

Basic Concepts About Revenue Management and Pricing; Different Approaches to Pricing; Application Examples; Price-Response Function; Pricing Models; Basic Price Optimization; Price Differentiation; Pricing With Constrained Supply; Pricing Under Competition; Variable Pricing; Market Segmentation; Capacity Allocation; Overbooking; Dynamic Pricing; Promotions and Markdown Management.

RUS255 (Rus) Russian I 3+0 4.0

Russian Alphabet; Transcriptions of Sounds in Russian; Russian Orthography; Phonetic Perception of Sounds; Consonants and Vowels; Intonation and Stress; Nouns: Proper and Common Nouns; Masculine, Feminine and Neutral Nouns; Russian

Names for Men and Women; The Use of Number with Nouns; Greeting Structures; Asking for Directions; Introducing Oneself; Asking and Telling the Time; Patterns Used in Shopping; Patterns Used in Telephone Conversations.

RUS256 (Rus) Russian II 3+0 4.0

Plural Nouns; Construction of Plural Nouns: Plural-only and Singular-only Nouns; Adjectives: Types of adjectives, Forms of Adjectives; Numbers: Different Types of Numbers; Verbs: Types of verbs; Infinitives; Tenses: Present Continuous Tense, Past Tense, Future Tenses; Action Verbs.

SAN155 Hall Dances 0+2 2.0

Basic concepts. The ethics of dance, Dance Nights, Dance Costumes, National International Competitions and rules/grading, Basic Definitions, Classifications of Dances: Social Dances; Salsa, Cha Cha, Samba, Mambo, Jive, Rock'n Roll, Jazz, Merenge; Flamenko, Rumba, Passa -Doble, Argentina tango, Vals, Disco, Quickstep, Foxtrot, Bolero, European Tango: Ballroom Dances; Sportive Dances; Latin American Dances; Samba, Rumba, Jive, Passa-Doble, Cha Cha, Standart Dances; European Tango, Slow vals (English), Viyana vals, Slow foxtrot, Quickstep.

SNT155 History of Art 2+0 2.0

History of Civilization and Evolution of Art: Prehistory to Present; Concepts and Terminology in Art with Samples; Interrelation among Art-Religion and Society; Effects of Religion on Artistic Development; Reflections and Interpretations of Judaism, Christianity and Islam on Art; Renaissance: Emergence, Effects, Artists, Works of Art; Architecture and Plastic Arts; Art in the 19th and 20th Centuries: Relevance of the main historical events of the period.

SOS153 Sociology 3+0 3.5

What is Sociology?; Methods and Research Strategies in Sociology; Theories of Sociology; Culture; Socialization; The Family; The Economy; Education; Religion; Political Institutions; Population; Social Groups; Social Stratification; Social Change; Urbanization and Urban Social Problems; The Industrialization Process and Effects of Industrialization; The Characteristics of Industrial Society; Crime and the Society; Science, Technology and Environment; Wars and the Effects of War on Society. What is Sociology?; Methods and Research Strategies in Sociology; Theories of Sociology; Culture; Socialization; The Family; The Economy; Education; Religion; Political Institutions; Population; Social Groups; Social Stratification; Social Change; Urbanization and Urban Social Problems; The Industrialization Process and Effects of Industrialization; The Characteristics of Industrial Society; Crime and the Society; Science, Technology and Environment; Wars and the Effects of War on Society.

SOS154 Man and Sociology 2+0 3.0

Sociology; Definition; Development of Sociology; Methods and Methodology in Social Sciences: Research procedure, Scientific method and sociology, Validity and reliability, Ethics of Social Research; Culture and Society; Family and Gender Issues; Environmental Issues and Society; Media and Communications; Stages of Industrialization; Industrial Revolution and its Consequences; Urban Life and Urbanization: Urban problems in Turkey; Social Inequalities; Social Stratification.

SOS155 Folkdance 2+0 2.0

Dance in Primitive Cultures; Dance in Earlier Civilizations; Dance in the Middle Age and Renaissance; Dance in the 18th and 19th Centuries; Dances of the 20th Century; Ballet; Turkish Dances; Emergence of Folkdance; Anatolian Folkdance: Classification, Accompanying instruments; Methods and Techniques of Collecting Folkdance; Problems in Collecting Folkdance; Teaching of Folkdance; Adapting Folkdance for Stage: Stage, Stage aesthetics and Choreography, Orientation and choreography.

TAR165 Atatürk's Principles and History of Turkish Revolution I 2+0 2.0

Reform efforts of Ottoman State, General glance to the stagnation period, Reform searching in Turkey, Tanzimat Ferman and its bringing, The Era of Constitutional Monarchy in Turkey, Policy making during the era of first Constitutional Monarchy, Europe and Turkey, 1838-1914, Europe from imperialism to World War I, Turkey from Mudros to Lausanne, Carrying out of Eastern Question, Turkish Grand National Assembly and Political construction 1920-1923, Economic developments from Ottomans to Republic, The Proclamation of New Turkish State, from Lausanne to Republic.

TAR166 Atatürk's Principles and History of Turkish Revolution II 2+0 2.0

The Restructuring Period; The Emergence of the fundamental policies in the Republic of Turkey (1923-1938 Period); Atatürk's Principles, and Studies on Language, History and Culture in the period of Atatürk; Turkish Foreign Policy and Application Principles in the period of Atatürk; Economic Developments from 1938 to 2002; 1938-2002 Period in Turkish Foreign Policy; Turkey after Atatürk's period; Social, Cultural and Artistic Changes and Developments from 1938 to Present.

TAR201 History of Science 2+0 2.5

Science in Ancient Civilisations: Egypt and Mesopotamia, Antique Greece and Hellenistic Period, The Roman Civilisation; Science in the Middle Ages in Europe and Islamic World; Renaissance and Modern Science: Astronomy, Chemistry,

Medicine, Biology, Physics, Mathematics, Galileo Galilei, Newton; The Age of Enlightenment: Astronomy, Mathematics and Physics in the 18th Century; The Industrial Revolution; Modern Science: Einstein's Revolution, Quantum Theory; Appearance of Atom Physics; Science today.

TER207 (Eng) Thermodynamics I 3+0 5.0

Basic Concepts; System; Phase and State; Phase Transitions; Zeroth Law of Thermodynamics; Ideal Gas and Phase Equation, First Law of Thermodynamics; Specific Heats; Internal Energy, Enthalpy and Specific Heat Capacity of Ideal Gases; Specific Heats of Solids and Fluids; Conservation of Mass; Conservation of Energy; Flow Work; Steady Flow Open System; Second Law of Thermodynamics; Heat Engines; Reversible and Irreversible Phase Transitions; Carnot Cycle; Clausius Inequality; Entropy, Principle of the Increase of Entropy; Third Law of Thermodynamics; Entropy Change of a Pure Substance; Entropy Changes in Ideal Gases; Reversible Steady Flow Work, Exergy and Second Law Analysis.

TER208 (Eng) Thermodynamics II 3+0 5.0

The Concept of Entropy; Entropy Change of a Pure Substance; Entropy Changes of Ideal Gases; Isentropic State Changes; T-Ds Relations; Reversible Processes; Work and Efficiency; Basic Thermodynamic Cycles; Carnot Cycle; Rankine Cycle; Inter-Combustion Engine Cycles: Otto and Diesel Cycles; Air Standards; Stirling and Ericson Cycles; Brayton Cycle; Refrigeration Cycles; Interheating; Effect of Intercooling and Regeneration Processes on Cycles.

TER403 Thermodynamics 3+0 4.5

Energy Engineering: Natural analogies and models; State and Path Functions; Heat and Work; Deviations from Ideals; Closed and Open Systems; Four Laws of Thermodynamics; Energy Transfer Processes: Power cycles, Alternative energy applications; Physical and Chemical Equilibrium Conditions; Free Energy: Its relationship with temperature, Pressure and composition; Availability, Efficiency; Coordination of Energy- Environment Interactions.

THU203 Community Services 0+2 3.0

Various Community Projects: Helping young students during their study periods or after school study sessions, Aiding the elderly in nursing homes, helping disabled individuals with various tasks, helping social services and aiding children with their education etc., take part in the projects which raise environmental awareness, Integrating with the community and enabling use of knowledge accumulated in the courses.

TiY121 Introduction to Theatre 2+0 3.0

Fundamentals of Theatre; Historical Developments of Theatre; Important Periods in World Theatre; Study of Contemporary Interpretations: Plays and Actors; Application of Basic Acting Techniques; Critiquing; Evaluation; Improvisation.

TiY152 Theatre 2+0 2.5

Theatre as a Cultural Institution: Relation of culture and theatre; The Place and Importance of Theatre in Culture; Theatre as a Communication Art: Definition of theatre, Origin and evolution of theatre, Aesthetic communication; Elements of Communication in Theatre: Decor, Costume, Stage, Actor, Director; Theatre Management: Historical development, Administration and Organization; Art Sociology: Theatre and society; Reflections of Cultural Issues in Turkish Plays. Reflections of Cultural Issues in Turkish Plays.

TiY308 Republic Era Turkish Theatre 2+0 3.0

Republic Era Turkish Theatre: Political, Social, Cultural Art Life; Theatre Concepts; Western Theatre; Theatre Perception; Effects of Western Theatre on Turkish Theatre; Dramatic Types; Acting Methods, Directing, Playwriting, Dramatic Styles; Theatre Buildings; Directing Techniques; Analyzing Developments of Theatre; Theatre Education; State Theatres; Private Theatre Companies.

TKY302 Quality Control 3+0 4.5

Quality Development and Quality Control: Quality development and dimensions of its concept, Probability and statistics in quality control; Quality Control in Total Quality Management; Statistical Methods Used in Quality Control: Variations and its measurement, Important batch and continuous dispersion, Sampling dispersions, Parameter estimate and hypothesis tests; Statistical Process Control (SPC): Philosophy of SPC and methods, Practice, Control charts for attributable and quantity variables, Other statistical process control methods, Process ability analysis, Acceptance (consent) sampling and sampling plans, Various quality standards. Quality Development and Quality Control: Quality development and dimensions of its concept, Probability and statistics in quality control; Quality Control in Total Quality Management; Statistical Methods Used in Quality Control: Variations and its measurement, Important batch and continuous dispersion, Sampling dispersions, Parameter estimate and hypothesis tests; Statistical Process Control (SPC): Philosophy of SPC and methods, Practice, Control charts for attributable and quantity variables, Other statistical process control methods, Process ability analysis, Acceptance (consent) sampling and sampling plans, Various quality standards.

TKY405 Total Quality Management 3+0 4.5

History of Total Quality Management; Excellence Model; Total Quality Management Service and Production Sector; Advanced Quality Techniques such as Failure Mode and Effect Analysis: Type of Failure Mode and Effect Analysis, Methods; Customer Satisfaction; Transformation of Customer Needs to Technical Requirements; Quality Function Deployment; Reducing Variance; Six Sigma Approach to Quality.

TKY411 (Eng) Quality Control **2+0 3.0**

Quality Development and Quality Control: Quality development and dimensions of its concept, Probability and statistics in quality control; Quality Control in Total Quality Management; Statistical Methods Used in Quality Control: Variations and its measurement, Important batch and continuous dispersion, Sampling dispersions, Parameter estimate and hypothesis tests; Statistical Process Control (SPC): Philosophy of SPC and methods, Practice, Control charts for attributable and quantity variables, Other statistical process control methods, Process ability analysis, Acceptance (consent) sampling and sampling plans, Various quality standards.

TOP102 Surveying **2+2 4.5**

Concepts Related to Topography; Simple Measurement Tools and Horizontal Measurement: Application of right angles, Application of right angles by the help of prisms, Application of lines; Length Measurement: Calculation of Surveying and levelment; Calculation of Area: Calculation of area according to measurement values, Calculation of area according to coordinate values, Calculation of area according to Cross Method; Theodolite and Angle Measurement: Measuring horizontal and vertical angles, Length measuring; Drawing Maps and Plans Using The Dimensions of a Field: Calculation of Coordinates; Calculation of Polygons. Concepts Related to Topography; Simple Measurement Tools and Horizontal Measurement: Application of right angles, Application of right angles by the help of prisms, Application of lines; Length Measurement: Calculation of Surveying and levelment; Calculation of Area: Calculation of area according to measurement values, Calculation of area according to coordinate values, Calculation of area according to Cross Method; Theodolite and Angle Measurement: Measuring horizontal and vertical angles, Length measuring; Drawing Maps and Plans Using The Dimensions of a Field: Calculation of Coordinates; Calculation of Polygons.

TOP102 (Eng) Surveying **2+2 4.5**

Concepts Related to Topography; Simple Measurement Tools and Horizontal Measurement: Application of right angles, Application of right angles by the help of prisms, Application of lines; Length Measurement: Calculation of Surveying and levelment; Calculation of Area: Calculation of area according to measurement values, Calculation of area according to coordinate values, Calculation of area according to Cross Method; Theodolite and Angle Measurement: Measuring horizontal and vertical angles, Length measuring; Drawing Maps and Plans Using The Dimensions of a Field: Calculation of Coordinates; Calculation of Polygons. Concepts Related to Topography; Simple Measurement Tools and Horizontal Measurement: Application of right angles, Application of right angles by the help of prisms, Application of lines; Length Measurement: Calculation of Surveying and levelment; Calculation of Area: Calculation of area according to measurement values, Calculation of area according to coordinate values, Calculation of area according to Cross Method; Theodolite and Angle Measurement: Measuring horizontal and vertical angles, Length measuring; Drawing Maps and Plans Using The Dimensions of a Field: Calculation of Coordinates; Calculation of Polygons.

TRS110 Technical Drawing in Civil Engineering **2+2 4.5**

Presentation of using materials at technical drawing, line types and using places. Scales; drawing views of solid objects by using projection methods, type and methods of dimensioning members; taking cross section methods from solid bodies. Types of perspective, perspective drawing methods of solid objects, architectural floor plans; architectural symbols of structural members. Drawing and dimensioning of main views of architectural floor plans. Drawing and dimensioning of cross section views according to architectural floor plan. Drawing and dimensioning of cross section views according to architectural floor plan, foundation type; foundation plan, symbol and cross section views. Drawing the cross section views and symbols of floor formwork plans.. Types of staircases in structure, drawing the plan and cross section of staircases. Drawing the plan and cross section views of roof. Drawing the cross section views and symbols of column application plans. Presentation of using materials at technical drawing, line types and using places. Scales; drawing views of solid objects by using projection methods, type and methods of dimensioning members; taking cross section methods from solid bodies. Types of perspective, perspective drawing methods of solid objects, architectural floor plans; architectural symbols of structural members. Drawing and dimensioning of main views of architectural floor plans. Drawing and dimensioning of cross section views according to architectural floor plan. Drawing and dimensioning of cross section views according to architectural floor plan, foundation type; foundation plan, symbol and cross section views. Drawing the cross section views and symbols of floor formwork plans.. Types of staircases in structure, drawing the plan and cross section of staircases. Drawing the plan and cross section views of roof. Drawing the cross section views and symbols of column application plans.

TRS110 (Eng) Technical Drawing in Civil Engineering **2+2 4.5**

Presentation of using materials at technical drawing, line types and using places. Scales; drawing views of solid objects by using projection methods, type and methods of dimensioning members; taking cross section methods from solid bodies. Types of perspective, perspective drawing methods of solid objects, architectural floor plans; architectural symbols of structural members. Drawing and dimensioning of main views of architectural floor plans. Drawing and dimensioning of cross section views according to architectural floor plan. Drawing and dimensioning of cross section views according to architectural floor plan, foundation type; foundation plan, symbol and cross section views. Drawing the cross section views and symbols of floor formwork plans.. Types of staircases in structure, drawing the plan and cross section of staircases.

Drawing the plan and cross section views of roof. Drawing the cross section views and symbols of column application plans. Presentation of using materials at technical drawing, line types and using places. Scales; drawing views of solid objects by using projection methods, type and methods of dimensioning members; taking cross section methods from solid bodies. Types of perspective, perspective drawing methods of solid objects, architectural floor plans; architectural symbols of structural members. Drawing and dimensioning of main views of architectural floor plans. Drawing and dimensioning of cross section views according to architectural floor plan. Drawing and dimensioning of cross section views according to architectural floor plan, foundation type; foundation plan, symbol and cross section views. Drawing the cross section views and symbols of floor formwork plans. Types of staircases in structure, drawing the plan and cross section of staircases. Drawing the plan and cross section views of roof. Drawing the cross section views and symbols of column application plans.

TRS127 Technical Drawing

2+2 4.5

Fundamentals of Engineering Graphics & Traditional Tools; Geometrical Construction (coordinate systems, drawing of simple geometric objects); Multiviews and Visualization (projection theory and orthographic projection); Perspective Views; Auxiliary and Section Views; Dimensions and Tolerances (dimensional tolerances, interferences, geometric tolerances and surface finish symbols); Drawing of Machine and Construction Components; Assembly and Working Drawings (title blocks, bill of materials, creating a technical drawing project and presentation); Introduction to Computer Aided Drawing.

TRS127 (Eng) Technical Drawing

2+2 4.5

Fundamentals of Engineering Graphics & Traditional Tools; Geometrical Construction (coordinate systems, drawing of simple geometric objects); Multiviews and Visualization (projection theory and orthographic projection); Perspective Views; Auxiliary and Section Views; Dimensions and Tolerances (dimensional tolerances, interferences, geometric tolerances and surface finish symbols); Drawing of Machine and Construction Components; Assembly and Working Drawings (title blocks, bill of materials, creating a technical drawing project and presentation); Introduction to Computer Aided Drawing.

TÜR120 Turkish Sign Language

3+0 3.0

Overview of Sign Language: Characteristics of sign language; History of Sign Language in the World: Emergence of language and sign language, Verbal education and approaches to sign language; History of Turkish Sign Language: Early period, Ottoman period, Period of the Republic of Turkey; Introduction to Turkish Sign Language: Finger alphabet, Pronouns, Introducing oneself and family, Greetings, Meeting, Relationship words; Showing Basic Words: Adjectives: Adjectives of quality, Adjectives of quantity; Verbs: Present tense, Past tense, Future tense, Time adverbs, Antonyms; Healthy Living: Expression of health-related problems, Sports terms, Expressing requirements; In a Bank: Expressions required to carry out basic procedures in a bank; Vacation: Basic words about vacation.

TÜR125 Turkish Language I

2+0 2.0

Language: Characteristics of language, Relationship between language and thought and language and emotion, Theories about the origin of languages, Language types, The position of Turkish Language among world languages; Relationship Between Language and Culture; Historical Progress of the Turkish Language; Alphabets Used for Writing in Turkish; Turkish Language Studies; Turkish Language Reform; Phonetics; Morphology and Syntax; The Interaction of Turkish Language with Other Languages; Wealth of Turkish Language; Problems Facing Turkish Language; Derivation of Terms and Words; Disorders of Oral and Written Expression.

TÜR126 Turkish Language II

2+0 2.0

Composition: Written composition, Paragraph and ways of expression in paragraphs; Punctuation; Spelling Rules; Types of Written Expression and Practices I: Expository writing; Types of Written Expression and Practices II: Narrative writing; Academic Writing and Types of Correspondence; Reading and Listening: Reading, Reading comprehension strategies, Critical reading; Listening; Relationship between Listening and Reading; Oral Expression: Basic principles of effective speech; Body Language and the Role of Body Language in Oral Expression; Speech Types; Principles and Techniques of Effective Presentation; Some Articulatory Features of Oral Expression.