Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

MMÜ466	ROBOTIC SYSTEMS				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	MMÜ466	ROBOTIC SYSTEMS	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
1. Elementary specifications of robotic technology, definitions, design and learning of control principles. 2. Designing and solving complex Robot designing.
Teaching Methods and Techniques:
Introduction to Robotics, Kinematics of robots, Homogenous and Inverse Kinematic Translations, Workspace Analysis, Trajectory Palanning, Statics and Dynamics of the robots, Control of Robots, Robot programming methods and languages, Special Study
Prerequisites:

Course Coordinator:

Instructors:
Associate Prof. Dr. Servet SoygüderProf. Dr. Hasan ALLİ
Assistants:

Recommended Sources

Textbook	:	1)	Robotik Sistemler Ders Notları (Prof. Dr. Hasan ALLİ-Assoc.Prof.Dr.Servet SOYGUDER)
Resources	:	2)	Robot Analysis and control, H. ASADA and J.J.E.SLOTINE, Wiley-Interscience, 1986.
Documents	:	3)	Fundementals of Robotics, R.J.SCHILLING, Prentice Hall, 1990
Assignments	:		
Exams	:		

Course Category

Mathmatics and Basic Sciences	:	10	**Education**	:	
Engineering	:	60	**Science**	:	
Engineering Design	:	30	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Definitions, Classification and robot characteristics.		
2	Kinematics of Robots		
3	Rotations and homogeneous transformations		
4	Inverse Kinematic transformations		
5	Workspace analysis and trajectory planning		
6	Diferantial movement and statics of robots.		
7	Manipulator Dynamics and Lagrange Equations		
8	MIDTERM EXAM		
9	Robot Control		
10	Single DOF PID control		
11	Calculated Torque Method		
12	Variable type control		
13	Methods of robot programming		
14	Programming Languages and Special Study		
15	EXCUSE EXAMINATION		

Course Learning Outcomes

No	Learning Outcomes
C01	Learning of Structural Analysis of Robotic systems
C02	Designing skills for single DOF displacement, velocity and force controled systems.
C03	Manipulator designing skills
C04	Skill of progmming of robots
C05	Industrial application designing and practicing skills.

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	1	%24
Quizzes	1	%4
Assignment	2	%4
Attendance	0	%0
Practice	0	%0
Project	1	%8
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	3	6	18
Hours for off-the-c.r.stud	3	6	18
Assignments	2	10	20
Presentation	0	0	0
Mid-terms	1	10	10
Practice	0	0	0
Laboratory	0	0	0
Project	1	12	12
Final examination	1	12	12
Total Work Load			**90**
ECTS Credit of the Course			**3**

Course Contribution To Program
Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM476	Wireless Communication				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM476	Wireless Communication	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
Learning the basic concepts of wireless communication, learning infrared, visible light and radio frequency communication systems, designing wireless communication systems and making applications.
Teaching Methods and Techniques:
Electromagnetic spectrum, wave propagation types, wireless communication terms, decibel concept, dBm power calculations, signal attenuation, modulation types, infrared (IR) communication systems and sample designs, visible light communication (VLC) systems and sample designs, Li-Fi vs. Wi-Fi, Radio Frequency (RF) communication systems, RF module types, sample applications of 433MHz ASK RF module, sample applications of 2.4GHz GFSK RF module, sample applications of Bluetooth module.
Prerequisites:

Course Coordinator:

Instructors:
Asist Prof. Dr. Ayhan AKBALAsist Prof. Yavuz EROL
Assistants:

Recommended Sources

Textbook	:	Practical Radio Engineering and Telemetry for Industry, Bilesim Publications, 2005. Remote Control Systems with Arduino and Android, Kodlab, 201
Resources	:	
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:		**Education**	:	
Engineering	:		**Science**	:	
Engineering Design	:	50	**Health**	:	
Social Sciences	:		**Field**	:	50

Course Content

Week	Topics	Study Materials	Materials
1	Wireless communication systems. Mobil communication systems.		
2	Cellular communication, capacity, frequency reuse and transfer (handover) techniques.		
3	The structure of the cellular communication system, the public telephone network and subsystems		
4	Cell definitions, cell coverage, selection of cells and frequency reuse.		
5	Channel capacity and traffic.		
6	nvestigation of interference effects.		
7	Structure and sector antennas used in cellular communication systems.		
8	The propagation in mobile cellular communication systems.		
9	Digital radio frequency (RF) modeling communication, source and channel coding.		
10	RF link structure, asymmetric links.		
11	RF link structure, asymmetric links.		
12	Forward link, or reverse link traffic channels.		
13	Start to Communication		
14	Power control and network planning.		

Course Learning Outcomes

No	Learning Outcomes
C01	Learn the Wireless Communication System Standards and System Design
C02	Learn modulation types of wireless comunication and concepts of VLC, OWC, Li-Fi, Wi-Fi, ASK, FSK, GFSK

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	1	%40
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	3	42
Hours for off-the-c.r.stud	14	4	56
Assignments	7	1	7
Presentation	0	0	0
Mid-terms	1	2	2
Practice	0	0	0
Laboratory	0	0	0
Project	2	5	10
Final examination	1	2	2
Total Work Load			**119**
ECTS Credit of the Course			**4**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P02	P03	P11
All	5		4
C01	4		
C02		4	4

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM474	Computer Network Communication				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM474	Computer Network Communication	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
A computer network design (including active and passive devices), the acquisition of the business and management ability. Acquisition of basic thinking skills to be able to follow the technological developments in computer networks.
Teaching Methods and Techniques:
Computer Networks, Digital Communications and general recipes. Coding techniques, to recognize and correct coding errors.
Prerequisites:

Course Coordinator:

Instructors:
Asist Prof. Dr. Ayhan AKBAL
Assistants:

Recommended Sources

Textbook	:	Computer Communication and Network Technology, R. Çölkesen and B. ÖRENCİK, 4th edition, Daisy Publishing, 2003. Computer Networks and Int
Resources	:	
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:	10	**Education**	:	
Engineering	:	50	**Science**	:	
Engineering Design	:	40	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Computer Networks, Digital Communications and general recipes.		
2	Coding techniques, to recognize and correct coding errors.		
3	OSI reference model, layers and functions.		
4	Protocols, protocol structure, layer protocols, TCP / IP protocol stack investigation.		
5	Transport, Network, a detailed analysis of the data link layer and the cap structure, addressing description.		
6	Static and adaptive routing algorithms.		
7	Frame structure, MAC addressing structures.		
8	Computer networking concepts, LAN, MAN, WAN topologies.		
9	LAN and WAN technologies.		
10	Network Devices, NIC, Repeater, HUB, Bridge, Switch, Router, Gateway studies, basic information for configurations.		
11	WAN technologies.		
12	Structured Cabling, Campus, Building, and horizontal cabling techniques.		
13	Internet addressing someone, subnets, IP routing, Internet service programs.		
14	Network operating systems, DNS, DHCP, FTP, etc. servers and network management software to view.		

Course Learning Outcomes

No	Learning Outcomes
C01	Learn the basic concepts of communication used in computer communication.
C02	The ability to manage project development business and the acquisition of a computer network.

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	1	%40
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	4	56
Hours for off-the-c.r.stud	14	2	28
Assignments	2	4	8
Presentation	0	0	0
Mid-terms	1	7	7
Practice	0	0	0
Laboratory	0	0	0
Project	0	0	0
Final examination	1	10	10
Total Work Load			**109**
ECTS Credit of the Course			**4**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P02	P03
All	4	5
C01	4	5
C02		4

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM472	Fiberoptic Communication				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM472	Fiberoptic Communication	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
Fiber cable properties, fiber optic line and teach the structure of the light source used in fiber optic data transmission.
Teaching Methods and Techniques:
Optical transmission history and usage requirements. S optical transmission, comparison with other transmission systems. Propagation of light in optical waveguides by electromagnetic wave theory. Plane and cylindrical waveguides.
Prerequisites:

Course Coordinator:

Instructors:
Asist Prof. Dr. Ayhan AKBAL
Assistants:

Recommended Sources

Textbook	:	Fiber Optic, S. ÖZSOY, Birsen Publishing House, İstanbul, 1998. Fiber Optic Communication Systems, GP Agrawal, J. Wiley and Sons, Inc., 1992.
Resources	:	
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:	10	**Education**	:	
Engineering	:	50	**Science**	:	
Engineering Design	:	40	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Optical transmission history and usage requirements.		
2	optical transmission, comparison with other transmission systems.		
3	Propagation of light in optical waveguides by electromagnetic wave theory.		
4	Plane and cylindrical waveguides.		
5	Optical fiber transmission characteristics, classification of fiber, and variable step-index fibers.		
6	Light: Reflection and refraction.		
7	Snell's Law, the refractive index of the optical fiber transmission characteristics.		
8	Fibre optic cable structure: the transmission characteristics of optical fiber.		
9	Optical fibers in the attenuation, absorption, scattering and bending losses		
10	Light sources and specifications.		
11	CCITT standards.		
12	The definition and properties of laser light sources.		
13	Laying fiber optic cable, making connections, diagnostics and troubleshooting.		
14	Fiber optic cable production.		

Course Learning Outcomes

No	Learning Outcomes
C01	Learn the basic fiber optic system.
C02	Fiberoptic communication and learn the system design.

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	1	%40
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	3	42
Hours for off-the-c.r.stud	14	3	42
Assignments	2	3	6
Presentation	0	0	0
Mid-terms	1	7	7
Practice	0	0	0
Laboratory	0	0	0
Project	0	0	0
Final examination	1	10	10
Total Work Load			**107**
ECTS Credit of the Course			**4**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P02	P03	P11
All	5	5	4
C01	5		
C02		5	

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM470	Microwave Technique				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM470	Microwave Technique	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
Electrical and Electronic Engineering with the goal of learning the basis of microwave transmission systems and to design the system.
Teaching Methods and Techniques:
Microwave transmission systems and system design.
Prerequisites:

Course Coordinator:

Instructors:
Asist Prof. Dr. Ayhan AKBAL
Assistants:

Recommended Sources

Textbook	:	Foundation for Microwave Engineering, Robert E. COLLIN, McGraw-Hill, 1992. Introduction to Antennas and Propagation, James R. WAIT, Peter PE
Resources	:	
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:	40	**Education**	:	
Engineering	:	60	**Science**	:	
Engineering Design	:		**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	The electromagnetic spectrum		
2	Transmission lines and calculation of transmission line parameters.		
3	Lossy and lossless lines		
4	Reflections and standing wave ratio in the transmission lines.		
5	Smith chart applications		
6	Smith chart applications		
7	Impedance matching techniques		
8	Impedance matching techniques		
9	Rectangular and circular waveguides and analysis.		
10	Waveguides in TE (transverse electric), TM (transverse magnetic) modes.		
11	Waveguide TEM (transverse electromagnetic) mode.		
12	The concept of the waveguide impedance and attenuation factor.		
13	Cavity resonators, Microstrip lines.		
14	Microwave generators		

Course Learning Outcomes

No	Learning Outcomes
C01	Defining communication engineering problems
C02	An ability to design a system desired.

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	1	%40
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	2	28
Hours for off-the-c.r.stud	0	0	0
Assignments	14	2	28
Presentation	7	3	21
Mid-terms	1	2	2
Practice	7	3	21
Laboratory	0	0	0
Project	3	6	18
Final examination	1	2	2
Total Work Load			**120**
ECTS Credit of the Course			**4**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P01	P02	P03	P04
C01	4	4		
C02			3	4

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM468	Communication Systems Laboratory				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM468	Communication Systems Laboratory	0	1	2

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
Described in communication theory to consolidate the theoretical knowledge test.
Teaching Methods and Techniques:
Obtaining the antenna radiation pattern. Fiber-optic communication applications. Satellite communication applications. Communication Matlab Toolbox applications. Microwave applications.
Prerequisites:

Course Coordinator:
Asist Prof. Dr. Ayhan AKBAL
Instructors:
Research Assist.Dr. Bircan KAMIŞLIOĞLU
Assistants:
Research Assist. ERMAN POLATResearch Assist. MUSAB COŞKUNResearch Assist. MELİKE ESEN

Recommended Sources

Textbook	:	Try Sheets. Basic Communication Theory, J PEARSON, Prentice Hall, 1993. Principles of Communication Systems, H. TAUBER and DL SCHILLING, M
Resources	:	
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:	10	**Education**	:	
Engineering	:	50	**Science**	:	
Engineering Design	:	40	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Making the explanation of the rules and laboratory experiments. Forming groups		
2	Making the explanation of the rules and laboratory experiments. Forming groups		
3	Making the explanation of the rules and laboratory experiments. Forming groups		
4	Experiment 1: Obtaining of the antenna radiation pattern.		
5	Experiment 2: RFID application.		
6	Experiment 3: radar applications.		
7	Experiment 4: Fiberoptic communications applications.		
8	Experiment 5: Satellite communications applications.		
9	Experiment 6: Microwave applications.		
10	Experiment 7: Matlab Communication Toolbox applications ..		
11	Quiz		

Course Learning Outcomes

No	Learning Outcomes
C01	Theoretically learn the practices he learned communication systems.
C02	Learn the antenna radiation pattern.
C03	Learn the RFID application.
C04	Learn the radar application.
C05	Fiberoptic communication, learn the application.
C06	Learn the satellite communication applications.
C07	Learn the microwave applications.
C08	Learn the Matlab Communication Toolbox application.

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	0	%0
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	7	%40
Project	0	%0
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	2	13	26
Hours for off-the-c.r.stud	0	0	0
Assignments	2	1	2
Presentation	0	0	0
Mid-terms	0	0	0
Practice	7	2	14
Laboratory	7	2	14
Project	0	0	0
Final examination	1	4	4
Total Work Load			**60**
ECTS Credit of the Course			**2**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P02	P03	P04	P06	P09	P10	P11
All						4	4
C01	3						
C02		3					
C03			4				
C04					2		
C05						4	
C06							2
C07				3			
C08			3				

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM464		Medical Electronics			
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM464	Medical Electronics	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
First aim of this course is to provide reguired information about medical devices and medical electronics circuits.
Teaching Methods and Techniques:
Biopotential, activation potential, ENG,EMG, ERG, EEG,ECG, Measurement blood pressure, Respiration system
Prerequisites:

Course Coordinator:

Instructors:
Asist Prof. Dr. Hasan Güler
Assistants:

Recommended Sources

Textbook	:	Prod.Dr.Inan Guler lecturer notes,Tıp Elektroniği, E. YAZGAN, M. KORÜTEK, İTÜ press
Resources	:	
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:		**Education**	:	
Engineering	:	20	**Science**	:	
Engineering Design	:	40	**Health**	:	40
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Introduction biomedical systems		
2	Cell and its structures		
3	Action potential		
4	Electrods, sensors and transducers		
5	Heart system		
6	ECG and amplifier circuits		
7	EEG and amplifier circuits		
8	EMG and amplifier circuits		
9	Respiration systems		
10	Ventilation and ventilator devices		
11	Telemetre		
12	Monitorization for patient		
13	Defibrilator and electrosurgical units		
14	ultrasound devices		

Course Learning Outcomes

No	Learning Outcomes
C01	Meeting biomedical systems
C02	Meeting medical devices

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	1	%40
Quizzes	0	%0
Assignment	1	%10
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	1	%50
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	3	42
Hours for off-the-c.r.stud	14	5	70
Assignments	2	5	10
Presentation	0	0	0
Mid-terms	1	2	2
Practice	0	0	0
Laboratory	0	0	0
Project	0	0	0
Final examination	1	2	2
Total Work Load			**126**
ECTS Credit of the Course			**4**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P01	P11
C01	4	4
C02	4	4

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM462	Programmable Digital Controllers and Applications				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM462	Programmable Digital Controllers and Applications	4	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
Teaching the basic elements of industrial automation systems and PLC programming techniques.
Teaching Methods and Techniques:

Prerequisites:

Course Coordinator:

Instructors:
Prof. Dr. Mustafa TÜRK
Assistants:

Recommended Sources

Textbook	:	
Resources	:	Programlanabilir Lojik Denetleyiciler, F. AKAR, M. YAĞIMLI, Beta,Programlanabilir Lojik Kontrolör ve Uygulamaları, S. KURTULAN, Bilişim
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:		**Education**	:	
Engineering	:	60	**Science**	:	
Engineering Design	:	40	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Elements Used in Electrical Control Circuits, Characteristics and Operating Principles		
2	Description of the current path circuit and power circuit		
3	Norman Used in Control Circuits		
4	Example Control Circuits		
5	PLC and structure.		
6	PLC functions and place in industry.		
7	Program and command concept.		
8	Advantages according to Classic Control System.		
9	Programming varieties.		
10	Programming with ladder diagram.		
11	Commands in the ladder diagram.		
12	Timers and Counters.		
13	Data transfer commands.		
14	Mathematical data processing commands.		

Course Learning Outcomes

No	Learning Outcomes
C01	Gain skills about PLC and design of different industrial application.

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	1	%40
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	2	28
Hours for off-the-c.r.stud	14	2	28
Assignments	3	6	18
Presentation	0	0	0
Mid-terms	1	2	2
Practice	0	0	0
Laboratory	14	2	28
Project	1	8	8
Final examination	1	2	2
Total Work Load			**114**
ECTS Credit of the Course			**4**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P02	P03	P04
All	3	3	3
C01	3	3	3

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM460	MODERN PROJECT SYSTEMS				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM460	MODERN PROJECT SYSTEMS	4	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
Öğrencilerin edindikleri bilgilerden yararlanarak herhangi bir endüstriyel sistemin projelendirilmesi becerisinin kazandırılması
Teaching Methods and Techniques:
Kumanda bilgilerinin tazelenmesi, Kuvvetli akım çizimi ile ilgili bilgilerinin hatırlatılması, endüstriyel projeden beklenen minimum istekler, çizim standartları, IEC, ANSI,..., küçük bir proje örneği üzerinde çalışma, proje çiziminde kullanılacak yazılımının tanıtılması(EPLAN), üzerinde çalışılan projelerin EPLAN'da çizilmesi.
Prerequisites:

Course Coordinator:

Instructors:
Asist Prof. Dr. Fikret ATA
Assistants:

Recommended Sources

Textbook	:	Ders Notları.
Resources	:	EPLAN yazılımı
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:	20	**Education**	:	
Engineering	:	40	**Science**	:	
Engineering Design	:	40	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Modern Projelendirme Sistemlerine giriş		Ders Notları
2	Kumanda bilgilerinin tazelenmesi		Ders Notları
3	Kuvvetli akım çizimi ile ilgili bilgilerinin hatırlatılması		Ders Notları
4	Endüstriyel projeden beklenen minimum istekler		Ders Notları
5	çizim standartları, IEC, ANSI,...,		Ders Notları
6	Küçük bir proje örneği üzerinde çalışma		Ders Notları
7	Uygulama-1		Ders Notları
8	Uygulama-2		Ders Notları
9	Üzerinde çalışılan projelerin EPLAN'da çizilmesi.		Ders Notları
10	proje çiziminde kullanılacak yazılımının tanıtılması(EPLAN)		Ders Notları
11	Proje-1		
12	Proje-2		
13	Proje-3		
14	Proje-4		

Course Learning Outcomes

No	Learning Outcomes
C01	Matematik, fen ve mühendislik bilgilerini uygulama becerisi
C02	Mühendislik problemlerini tanımlama, formüle etme ve çözme becerisi

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	1	%40
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	0	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	4	56
Hours for off-the-c.r.stud	14	1	14
Assignments	14	1	14
Presentation	0	0	0
Mid-terms	1	2	2
Practice	14	2	28
Laboratory	0	0	0
Project	4	1	4
Final examination	1	2	2
Total Work Load			**120**
ECTS Credit of the Course			**4**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P02	P10
C01	4	
C02		4

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM458	Process Control Lab.				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM458	Process Control Lab.	0	1	2

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
Kumanda devreleri ve PLC bağlantılarını öğrenmek ve çeşitli uygulamalar gerçekleştirmek.
Teaching Methods and Techniques:
Control circuits. PLC applications. Transducers for light measurement applications. Air flow sensors and air pressure transducers. Input-output transducers. Inductive transducers. Converters. Control Parameter Adjustment by Ziegler-Nichols Method. Control System Simulation with CC Program.
Prerequisites:

Course Coordinator:
Prof. Dr. Mustafa POYRAZ
Instructors:

Assistants:

Recommended Sources

Textbook	:	Handouts
Resources	:	
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:		**Education**	:	
Engineering	:	50	**Science**	:	
Engineering Design	:	50	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Control circuits.		
2	PLC Applications		
3	PLC Applications		
4	Transducers for light measurement applications		
5	Air flow sensors and air pressure transducers		
6	Input-Output Transducers		
7	Inductive transducers		
8	Converters		
9	Control Parameter Adjustment by Ziegler-Nichols method		
10	Control System Simulation with CC Program.		

Course Learning Outcomes

No	Learning Outcomes
C01	Bireysel ya da grup içerisinde çalışabilme becerisini kazanacaklar
C02	Öğrenciler deney tasarlama, deney yapma, sonuçlarıanaliz etme ve yorumlama becerisini kazanacaklar
C03	Mühendislik uygulamaları için gerekli teknikleri, yöntemleri ve araçları kullanma becerisini kazanacaklar

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	0	%40
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	0	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	2	28
Hours for off-the-c.r.stud	14	2	28
Assignments	0	0	0
Presentation	0	0	0
Mid-terms	1	2	2
Practice	0	0	0
Laboratory	0	0	0
Project	0	0	0
Final examination	1	2	2
Total Work Load			**60**
ECTS Credit of the Course			**2**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P04	P05	P08
All	3	5	3
C01			3
C02	3	5	
C03	3		

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM456	MODERN CONTROL METHODS OF ELECTRICAL MACHINES				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM456	MODERN CONTROL METHODS OF ELECTRICAL MACHINES	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
In this course control methods of dc and ac motors are described. Students will have knowledge about the closed-loop control of the motors using modern drives.
Teaching Methods and Techniques:
Speed Control of DC Motors. DC chopper feeding DC motors and its analysis . Analysis of two-quadrant DC chopper drives. Analysis of four-quadrant DC chopper drives. Closed loop speed control of DC motors. Speed control of Induction Motor. Frequency control of Induction Motor. Closed loop sliding mode control of Induction Motor. Vector control of Induction Motor. Cyclconverter drives. Principle of slip energy recovery of wound rotor induction motors. Traditional Scherbius system. Slip energy recovery of wound rotor induction motor using cascade connected static converters. Speed control of wound rotor induction motor using static control of rotor resistance. Speed control of wound rotor induction motor using static control of rotor resistance.
Prerequisites:

Course Coordinator:

Instructors:
Asist Prof. Abuzer ÇALIŞKAN
Assistants:

Recommended Sources

Textbook	:	Power points of the lecture prepared by Sedat Sünter. Handouts.
Resources	:	M. Rashid, Power Electronics, Pearson, 2014. ,J. M. D. MURPHY and F. G. TURNBULL, Power Electronic Control of AC Motors, Pergamon Pres, 198
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:	20	**Education**	:	
Engineering	:	80	**Science**	:	
Engineering Design	:		**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Speed Control of DC Motors.		Handouts.
2	DC chopper feeding DC motors and its analysis.		Handouts.
3	Analysis of two-quadrant DC chopper drives.		Handouts.
4	Analysis of four-quadrant DC chopper drives.		Handouts.
5	Closed loop speed control of DC motors.		Handouts.
6	Speed control of Induction Motor.		Handouts.
7	Frequency control of Induction Motor.		Handouts.
8	Closed loop sliding mode control of Induction Motor.		Handouts.
9	Closed loop sliding mode control of Induction Motor.		Handouts.
10	Vector control of Induction Motor.		Handouts.
11	Cyclconverter drives.		Power point presentations.
12	Principle of slip energy recovery of wound rotor induction motors.		Power point presentations.
13	Traditional Scherbius system. Slip energy recovery of wound rotor induction motor using cascade connected static converte		Power point presentations.
14	Speed control of wound rotor induction motor using static control of rotor resistance.		Power point presentations.

Course Learning Outcomes

No	Learning Outcomes
C01	The students will accommodate innovations and developing technology, progresses in the drive technology.
C02	They will gain application ability of mathematics, science and engineering knowledge which have been learnt in the other courses such as power electronic, power electronic systems, engineering m

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	1	%40
Quizzes	0	%0
Assignment	1	%0
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	0	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	2	28
Hours for off-the-c.r.stud	14	6	84
Assignments	0	0	0
Presentation	0	0	0
Mid-terms	1	2	2
Practice	0	0	0
Laboratory	0	0	0
Project	0	0	0
Final examination	1	2	2
Total Work Load			**116**
ECTS Credit of the Course			**4**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P01	P02
C01	3	3
C02	4	4

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM454	Energy Line Enegineering				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM454	Energy Line Enegineering	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
- Obtaining the long transmission lines equations and solving the transmission line problems - Using the general equation of states in different conditions - Learning the electrical and mechanical calculations of electrical energy transmission lines
Teaching Methods and Techniques:
Short, medium and long transmission lines. Electrical and mechanical components of transmission lines. Calculations of transmission lines.
Prerequisites:

Course Coordinator:

Instructors:
Associate Prof. Dr. Muhsin Tunay GENÇOĞLU
Assistants:

Recommended Sources

Textbook	:	Lecture notes prepared by Assoc. Prof.Dr. Muhsin Tunay Gençoğlu and power point presentations.
Resources	:	Enerji İletimi (Elektrik Hesaplar), Prof. Dr. Hüseyin ÇAKIR, YTÜ, 1989. ,Yüksek Gerilim Enerji Nakil Hatları Proje, Atilla YUNUSOĞLU, 2004. ,Electric
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:	50	**Education**	:	
Engineering	:	40	**Science**	:	
Engineering Design	:	10	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Electrical calculations and equivalent circuit of long transmission lines, voltage and current equations for beginning of line.		
2	Equivalent ? and equivalent T circuits of long transmission lines, special state of the long transmission lines.		
3	Asymmetric pi and T circuits.		
4	Serial and parallel connection of four-ended circuits.		
5	Equation for different cases for mechanical calculations of transmission lines.		
6	Range explanation, critical range and calculation of critical temperature.		
7	Control of up-lift.		
8	Calculation of confiscation and easement fields.		
9	Calculation of (ag-aw) formula.		
10	Diagrams of conductor oscillation.		
11	HV and UHV pylons, it's features and basis structures.		
12	Utilize as corner transporter of transporter pylons.		
13	Sample calculations		
14	Sample calculations		

Recommended Optional Programme Components

EEM305 Power Systems-1

Course Learning Outcomes

No	Learning Outcomes
C01	The Students will be able to calculate all tensions and sags stated in the technical specifications of a power transmission line, for different medium conditions
C02	To have knowledge about the properties and the accessories of power transmission lines

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	1	%40
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	3	42
Hours for off-the-c.r.stud	14	5	70
Assignments	1	4	4
Presentation	0	0	0
Mid-terms	1	2	2
Practice	0	0	0
Laboratory	0	0	0
Project	0	0	0
Final examination	1	2	2
Total Work Load			**120**
ECTS Credit of the Course			**4**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P01	P02	P04
All	4		
C01	4		4
C02		4	4

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM452	Industrial Electric				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM452	Industrial Electric	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
The aim of this module is to give ideas and concepts on electric systems used in industry.
Teaching Methods and Techniques:
Learn the working principles and application fields of industrial furnaces, to be able to learn light control, phase control and temperature control, the motor selection and control, make presentation.
Prerequisites:

Course Coordinator:

Instructors:
Asist Prof. Dr. Sencer ÜNAL
Assistants:

Recommended Sources

Textbook	:	
Resources	:	Modern Industrial Electronics, Timothy J. Maloney, Prentice Hall, 1996. ,Industrial Electricity and Motor Controls, R. and M. Miller, Mc Graw Hill, 20
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:		**Education**	:	
Engineering	:	70	**Science**	:	
Engineering Design	:	30	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Overview of industrial electric subjects. Determination of semester work subjects.		
2	Resistance heating.		
3	Electric furnaces.		
4	Arc furnaces.		
5	Induction heating.		
6	Induction furnaces.		
7	Temperature Control.		
8	light control		
9	Control of Phase Sequence and phase interruption.		
10	Backup power supplies and uninterruptible power supplies		
11	Hydraulic and pneumatic control elements.		
12	Hydraulic and pneumatic systems		
13	Semester work presentation		
14	Semester work presentation		

Course Learning Outcomes

No	Learning Outcomes
C01	Learn how to design and structure of the system in the industry
C02	To gain skills in team work and design
C03	They will learn how to write report for a project and they will increase their communication skills.

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	0	%20
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	0	%0
Project	0	%30
Final examination	0	%50
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	3	42
Hours for off-the-c.r.stud	2	14	28
Assignments	0	0	0
Presentation	2	3	6
Mid-terms	1	2	2
Practice	0	0	0
Laboratory	0	0	0
Project	1	28	28
Final examination	1	2	2
Total Work Load			**108**
ECTS Credit of the Course			**4**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P01	P03	P06	P08
C01	4			
C02		3		2
C03			3	

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM450	Special Electrical Machines				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM450	Special Electrical Machines	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
To learn the structure and operation of special electric machines by classifying. To learn the places where special electric machines are used
Teaching Methods and Techniques:
The situations special electrical machines are used. Classification of special electrical machines; permanent magnets and its applications. Permanent magnet DC and Synchronous machines The Equivalent circuits, constructions and apliciations of Permanent magnet DC and Synchronous machines Hysteresis and Reluctance Machines. Stepper Motors; types, constructions and control principles. Mass-rotor induction machines. Rotational, linear motion Machines; Equivalent circuits, parameters and applications. Mid Term Axial flux electrical machines. Reactions of special electric machines under changeable voltage and frequency. Analysis of special electric machines Field investigation for special electric machines. Design principles of special electric machines.
Prerequisites:

Course Coordinator:

Instructors:
Prof. Dr. Hasan KÜRÜM
Assistants:

Recommended Sources

Textbook	:	Özel Elektrik makinaları, Güngör BAL, Seçkin Yayıncılık, 2004. Electric Motors and Control Techniques, Irving M. GOTTLIEB, McGraw-Hill Professiona
Resources	:	
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:		**Education**	:	
Engineering	:	100	**Science**	:	
Engineering Design	:		**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	The situations special electrical machines are used.		
2	Classification of special electrical machines; permanent magnets and its applications.		
3	Permanent magnet DC and Synchronous machines		
4	The Equivalent circuits, constructions and apliciations of Permanent magnet DC and Synchronous machines		
5	Hysteresis and Reluctance Machines.		
6	Stepper Motors; types, constructions and control principles.		
7	Mass-rotor induction machines.		
8	Rotational, linear motion Machines; Equivalent circuits, parameters and applications.		
9	Mid Term		
10	Axial flux electrical machines.		
11	Reactions of special electric machines under changeable voltage and frequency.		
12	Analysis of special electric machines		
13	Field investigation for special electric machines.		
14	Design principles of special electric machines.		

Course Learning Outcomes

No	Learning Outcomes
C01	Having sufficient background in basic mathematics and sciences and basic engineering; ability to use conceptual and practical knowledge together in this area for engineering solutions.
C04	Ability to choose modern techniques and equipments that are necessary for electrical electronics engineering applications, to have an ability to use package programs effectively.

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	1	%40
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	3	42
Hours for off-the-c.r.stud	0	0	0
Assignments	4	16	64
Presentation	0	0	0
Mid-terms	1	2	2
Practice	0	0	0
Laboratory	0	0	0
Project	0	0	0
Final examination	1	2	2
Total Work Load			**110**
ECTS Credit of the Course			**4**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P01	P04
All	4	4
C01	4	
C04		4

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM448		Energy Distribution and Project			
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM448	Energy Distribution and Project	4	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
Drawing the distribution project based on 1/1000 scaled zoning plan, learning the fundamentals of drawing LV distribution project, to do all the calculations regarding the project, selecting the types of transmission tower, learning the fundamentals of drawing MV project.
Teaching Methods and Techniques:
Drawing principles for distribution project. Calculations of power, moment, conductor and voltage drop. Drawing of LV energy distribution project.
Prerequisites:

Course Coordinator:

Instructors:
Asist Prof. Dr. Mahmut Temel ÖZDEMİR
Assistants:

Recommended Sources

Textbook	:	Lecture notes and power point presentations.
Resources	:	Elektrik Şebeke ve Tesisleri, Mahmut NACAR, 2003. ,Yüksek Gerilim Enerji Nakil Hatları Proje, Atilla YUNUSOĞLU, 2004., Elektrik Enerjisi Dağıtımı, M
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:		**Education**	:	
Engineering	:	50	**Science**	:	
Engineering Design	:	50	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	LV distribution project sustaining an area consist of distributed load with two distribution transformers.		
2	Drawing principle for distribution project.		
3	Illumination features at road, bend and crossroads.		
4	Position principle of transformers. Determination of pillar location.		
5	Drawing of draft project.		
6	Calculation of pillar power.		
7	Calculation of moment and conductor. Determine of line orders.		
8	Control as to heating and voltage drop.		
9	Calculation of transformer power and drawing of single line schema.		
10	Types of pillar and traverse and it's calculation and selection.		
11	Drawing of LV energy distribution project.		
12	Route etude of MV power transmission line.		
13	Plan and profile of MV power transmission line.		
15	Type projects with 3 AWG conductor.		

Course Learning Outcomes

No	Learning Outcomes
C01	The Students will be able to learn principles of energy distribution and LV-MV network elements
C02	The Students will be able to realize drawing of LV energy distribution project.
C03	The Students will be able to use basic engineering knowledge and material/equipment knowledg

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	0	%0
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	1	%10
Project	1	%30
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	4	56
Hours for off-the-c.r.stud	14	2	28
Assignments	0	0	0
Presentation	0	0	0
Mid-terms	0	0	0
Practice	1	6	6
Laboratory	0	0	0
Project	14	3	42
Final examination	1	2	2
Total Work Load			**134**
ECTS Credit of the Course			**4**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P01	P02	P03
C01		4	
C02			5
C03	3		

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM446	Digital Communications				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM446	Digital Communications	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
Replaced by digital communication in communication theory, learn the importance and concept, to recognize modulation type. To show a diagram of the modulator using building blocks and Fourier Transform to make the time and frequency domain analysis.
Teaching Methods and Techniques:
week Subject 1 Introduction to the requirements of digital communication and digital communication. 2 definitions used in digital communication (bit, byte, baud, baud rate, channel capacity, etc.). 3 bit error rate in the baseband data transmission, bit error probability for binary signals. The relationship between the signal to noise ratio of 4 Error probability. 5 digitization of the analog signal. 6 Sampling Theorem. 7 Quantization techniques. 8 pulse amplitude, pulse duration, pulse position and pulse code modulation. 9 Delta, linear delta, delta adaptive differential pulse code modulation techniques and the advantages. 10 Quantization coding of signals were followed. 11 Decoding techniques and filters. 12 transmission of digital signals and line coding techniques. 13 Icons from interference and pulse shaping. 14 Amplitude, frequency and phase shift keying techniques and types.
Prerequisites:

Course Coordinator:

Instructors:
Asist Prof. Dr. Ayhan AKBAL
Assistants:

Recommended Sources

Textbook	:	Sayısal Haberleşme, Ahmet H.KAYRAN,Erdal PANAYIRCI,Ümit AYGÖLÜ,Sistem Yayıncılık, 1996. İletişim Kuramı, Haluk DERİN, Murat AŞKAR, ODTÜ
Resources	:	
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:		**Education**	:	
Engineering	:	40	**Science**	:	
Engineering Design	:	60	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	The necessity of introduction to digital communication and digital communication.		
2	Definitions used in digital communication (bit, byte, baud, baud rate, channel capacity, etc.).		
3	The baseband data transmission bit error rate, bit error probability for binary signals.		
4	The relationship between signal to noise ratio of the probability of error.		
5	The digitization of the analog signal		
6	Sampling theorem		
7	Quantization techniques		
8	Pulse amplitude, pulse duration, pulse position and pulse code modulation		
9	Delta, linear delta, delta adaptive differential pulse code modulation techniques and provides		
10	Quantization coding of signals were followed		
11	Decoding techniques and filters		
12	Transmission of digital signals and error coding techniques		
13	Intersymbol interference and pulse shaping		
14	Amplitude, frequency and phase shift keying techniques and types		

Course Learning Outcomes

No	Learning Outcomes
C01	Learns to Communication Systems
C02	Design and analyze a system

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	1	%40
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	3	13	39
Hours for off-the-c.r.stud	0	0	0
Assignments	2	33	66
Presentation	0	0	0
Mid-terms	2	5	10
Practice	0	0	0
Laboratory	0	0	0
Project	0	0	0
Final examination	1	5	5
Total Work Load			**120**
ECTS Credit of the Course			**4**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P01	P02	P03	P04	P05
C01	4	4			
C02			3	4	4

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM444	DIGITAL CONTROL				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM444	DIGITAL CONTROL	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
1. Sayısal kontrol sistemlerinin özelliklerinin öğrenilmesi 2. Sayısal kontrolör tasarımının gerçekleştirilmesi
Teaching Methods and Techniques:
Sürekli ve ayrık zamanlı kontrol sistemleri. Sürekli zamanlı sistemlerin ayrık zamanlı sistemlere dönüştürülmesi. Darbe transfer fonksiyonu (PTF). Yıldızlanmış Laplace dönüşümü. s-düzleminden z-düzlemine dönüşüm. Ayrık zamanlı sistemlerin kararlılığı. Ayrık zamanlı sistemlerin geçici ve sürekli hal cevap ve performansları. Kök-yer (root locus) eğrileri ile ayrık zamanlı kontrolör tasarımı. Ayrık zamanlı sistemlerin frekans cevabı. Bode diyagramı ile ayrık zamanlı kontrolör tasarımı. Ayrık zamanlı sistemlerin analitik yöntemle zaman-optimal kontrolör tasarımı. Ayrık zamanlı sistemlerin durum uzay modeli. Ayrık zamanlı sistemlere durum geri beslemeli kontrolör tasarımı.
Prerequisites:

Course Coordinator:

Instructors:
Prof. Dr. Arif GÜLTEN
Assistants:

Recommended Sources

Textbook	:	
Resources	:	
Documents	:	Discrete-Time Control Systems , Katsuhiko Ogata,, 2nd Edition, Prentice Hall.
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:	40	**Education**	:	
Engineering	:	40	**Science**	:	
Engineering Design	:	20	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Sürekli ve ayrık zamanlı kontrol sistemleri.		
2	Sürekli zamanlı sistemlerin ayrık zamanlı sistemlere dönüştürülmesi.		
3	Darbe transfer fonksiyonu (PTF) kavramı ve uygulamaları.		
4	Yıldızlanmış Laplace Dönüşümü		
5	s-düzleminden z-düzlemine dönüşüm		
6	Ayrık zamanlı sistemlerin kararlılığı.		
7	Ayrık zamanlı sistemlerin geçici ve sürekli hal cevap ve performansları		
8	Ayrık zamanlı sistemlerde Kök Yer Eğrisi analizi.		
9	Kök-yer (root locus) eğrileri ile ayrık zamanlı kontrolör tasarımı		
10	Ayrık zamanlı sistemlerin frekans cevabı		
11	Bode diyagramı ile ayrık zamanlı kontrolör tasarımı		
12	Ayrık zamanlı sistemlerin analitik yöntemle zaman-optimal kontrolör tasarımı.		
13	Ayrık zamanlı sistemlerin durum uzay modeli		
14	Ayrık zamanlı sistemlere durum geri beslemeli kontrolör tasarımı.		

Course Learning Outcomes

No	Learning Outcomes
C01	Sayısal kontrol sistemlerinin analizini gerçekleştirmek
C02	Sayısal kontrolör tasarımının gerçekleştirilmesi

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	1	%40
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	3	42
Hours for off-the-c.r.stud	14	2	28
Assignments	12	3	36
Presentation	0	0	0
Mid-terms	1	2	2
Practice	5	2	10
Laboratory	0	0	0
Project	0	0	0
Final examination	1	2	2
Total Work Load			**120**
ECTS Credit of the Course			**4**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P01	P02	P03
All	3	4	3
C01	3	4	
C02	3	4	4

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM438	Power Electronics Lab.				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM438	Power Electronics Lab.	0	1	2

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
An essential part of learning process is to implement the ideas and concepts discussed in "Power Electronics" and "Power Electronic Systems" modules in the laboratory. Therefore, it is aimed for the students to gain practice by performing relevant laboratory experiments.
Teaching Methods and Techniques:
First two weeks; the groups will be determined and the students will be informed about the experiments and the lab rules. Each week nine experiments will be carried out simultaneously. The students will perform the experiments in turn each week. At the beginning of the experiment the instructor will make a short quiz (could be written or oral) then the experiment will be carried out by the students in the group under supervision of the instructor. The final exam will be done in two steps: Written exam in the classroom and oral exam in the lab in which each student will determine their experiment by a draw.
Prerequisites:

Course Coordinator:
Prof. Dr. Hasan KÜRÜM
Instructors:

Assistants:
Research Assist. Fatma MURATResearch Assist. Erman ÖZPOLATResearch Assist. Ezgi TAŞKINResearch Assist. Kıvanç DOĞANResearch Assist. Merve YILDIRIMResearch Assist.Dr. Bircan ÇALIŞIRResearch Assist. Abdülcelil KÜLEKÇİOĞLUResearch Assist. Melike ESEN

Recommended Sources

Textbook	:	Prof.Dr. Sedat Sünter, Power Electronics Lab Sheets, 2014.
Resources	:	Power Electronics Lab Sheets, Prof.Dr. Sedat SÜNTER, 2014.
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:	10	**Education**	:	
Engineering	:	10	**Science**	:	
Engineering Design	:	80	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Lecturing the experiments in the classroom.		Lab sheets.
2	Lecturing the experiments in the classroom.		Lab sheets.
3	Performing the related experiments in the power electronics lab.		Lab sheets.
4	Performing the related experiments in the power electronics lab.		Lab sheets.
5	Performing the related experiments in the power electronics lab.		Lab sheets.
6	Performing the related experiments in the power electronics lab.		Lab sheets.
7	Performing the related experiments in the power electronics lab.		Lab sheets
8	Performing the related experiments in the power electronics lab.		Lab sheets
9	Performing the related experiments in the power electronics lab.		Lab sheets
10	Performing the related experiments in the power electronics lab.		Lab sheets
11	Performing the related experiments in the power electronics lab.		Lab sheets
12	Experiment weeks for the students who have an excuse.		Lab sheets
13	Evaluation of the lab reports preaperad by the groups.		Lab reports
14	Evaluation of the lab reports preaperad by the groups.		Lab reports

Course Learning Outcomes

No	Learning Outcomes
C01	The students will gain design ability for desired power electronic systems.
C02	They will learn how to work in a group or team.
C03	They will gain ability of designing experiment, testing, analyzing empirical results and interpretation of the experimental results.
C04	They will learn how to write a report.

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	0	%0
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	9	%50
Project	0	%0
Final examination	1	%50
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	5	2	10
Hours for off-the-c.r.stud	0	0	0
Assignments	9	2	18
Presentation	0	0	0
Mid-terms	0	0	0
Practice	0	0	0
Laboratory	9	2	18
Project	0	0	0
Final examination	1	1	1
Total Work Load			**47**
ECTS Credit of the Course			**2**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P03	P05	P06	P08
All	4	5	3	4
C01	4			
C02				4
C03		5		
C04			3	

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM412	Telecommunication Lab.				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM412	Telecommunication Lab.	0	1	2

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
The theoretical knowledge described in communication theory to consolidate with experiment tests. Modulation what it does, types, how to do and to see demodulation experimentally. Sampling, Time Division Multiplexing and Pulse Code Modulation to see experimentally. Radio-Frequency Communications to perform helping of the RF receiver-transmitter module with 433MHz frequency. To learn how to use the Spectrum Analyzer. To examine AM (Amplitude Modulation), FM (Frequency Modulation) and PWM (Pulse Code Modulation) Modulation-Demodulation techniques. To obtain the amplitude responses of analogue filters, and to analyses for the different frequency.
Teaching Methods and Techniques:
To explain of the laboratory rules. Establishment of experimental group. Experiment 1: AM MODULATOR demodulator Experiment 2: MODULATOR FM demodulator Experiment 3: Pulse Code Modulation (PCM) Experiment 4: ANALOG FILTERS Experiment 5: RADIO FREQUENCY COMMUNICATION Experiment 6: Spectrum Analyzer Experiment 7: PULSE WIDTH MODULATOR demodulator (PWM) Recompense experiment
Prerequisites:
(EEM314 or EEM313)
Course Coordinator:

Instructors:
Associate Prof. Dr. Duygu KAYA
Assistants:
Research Assist. KIVANÇ DOĞANResearch Assist. M.SEFA ÇETİN Research Assist. Esra İNCEResearch Assist. EZGİ KILINÇResearch Assist. FATMA MURAT

Recommended Sources

Textbook	:	Basic Communication Theory, J. E. PEARSON, Prentice Hall, 1993. Principles of Communication Systems, H. TAUB and D. L. SCHILLING, McGraw-H
Resources	:	
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:		**Education**	:	
Engineering	:	40	**Science**	:	
Engineering Design	:	60	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	AM MODULATOR demodulator		
2	FM MODULATOR FM demodulator		
3	ADC		
4	DAC		
5	RADIO FREQUENCY COMMUNICATION/Spectrum Analyzer		
6	ANALOG FILTERS		
7	INVESTIGATION OF ANALOG MODULATION TECHNIQUES WITH MATLAB		

Course Learning Outcomes

No	Learning Outcomes
C01	To learn the modulation techniques
C02	Analogue Filter Design
C03	The Radio-Frequency telecommunication
C04	Use of Spectrum analyzers

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	0	%0
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	7	%40
Project	0	%0
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	2	13	26
Hours for off-the-c.r.stud	0	0	0
Assignments	2	1	2
Presentation	0	0	0
Mid-terms	0	0	0
Practice	7	2	14
Laboratory	7	2	14
Project	0	0	0
Final examination	1	4	4
Total Work Load			**60**
ECTS Credit of the Course			**2**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P02	P04	P05
C01	4	4	5
C02	4	4	5
C03	4	4	5
C04	4	4	5

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM406	Electric Installation Lab.				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM406	Electric Installation Lab.	0	1	2

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
Developing application and design for Power System, Electrical Machines and Electrical Energy Generation Systems lessons: protection on substations, reactive power compensation for industrial installations, electricity generation with synchronous generator, photovoltaic cell and fuel cell, asynchronous motors and control methods, control of voltage and frequency in small hydroelectric power plant.
Teaching Methods and Techniques:
Making experimental studies to consolidate the theoretical knowledge at the subjects of Power System, Electrical Machines and Electrical Energy Generation Systems.
Prerequisites:
(EEM305 or EEM306)
Course Coordinator:
Prof. Dr. Muhsin Tunay GENÇOĞLU
Instructors:

Assistants:
Research Assist. Barış KARAKAYAAsist Prof. Dr. Mahmut Temel ÖZDEMİRResearch Assist. Merve YILDIRIMResearch Assist. Rumeysa KÜLEKÇİOĞLUResearch Assist. Abdülcelil KÜLEKÇİOĞLUResearch Assist. Melike ESENResearch Assist. Nurbanu MACİT

Recommended Sources

Textbook	:	- F.U. Eng. Fac. Dep. of EEE Electrical Installation Lab Sheets
Resources	:	
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:		**Education**	:	
Engineering	:	80	**Science**	:	
Engineering Design	:	20	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Determination of the groups		
2	Explaining about experiments and laboratory rules by laboratory contact person		
3	Experiment-1: Performing with PLC of over voltage protection at transformer stations.		
4	Experiment-2: Over voltage protection of transformer stations.		
5	Experiment-3: Measure transformers.		
6	Experiment-4: Reactive power compensation at industrial plants.		
7	Experiment-5: Obtaining to electrical energy from solar energy		
8	Experiment-6: Electrical control circuit		
9	Experiment-7: Synchronous generator with parallel grid connected		
10	Experiment-8: Starting to asynchronous motors and speed control methods.		
11	Experiment-9: Generation of electricity with fuel cell.		
12	Experiment-10: Control of voltage and frequency in small hydroelectric power plant.		
13	Experiment weeks for the students who have an excuse.		
14	Experiment weeks for the students who have an excuse.		

Course Learning Outcomes

No	Learning Outcomes
C01	Recognize, select and use interior installation equipments
C02	Diagnose, analysis and fix electrical installation faults
C03	The student will be able to design an experimental setup, realize an experimental setup, identify, select and use measurement equipments related to electrical engineering

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	0	%0
Quizzes	0	%0
Assignment	10	%10
Attendance	0	%0
Practice	10	%30
Project	0	%0
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	0	0	0
Hours for off-the-c.r.stud	10	1	10
Assignments	10	2	20
Presentation	0	0	0
Mid-terms	1	6	6
Practice	0	0	0
Laboratory	14	2	28
Project	0	0	0
Final examination	1	2	2
Total Work Load			**66**
ECTS Credit of the Course			**2**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P03	P04	P05
C01	4	4	
C02	4		4
C03	4		5

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM404	Graduation Thesis				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM404	Graduation Thesis	2	1	12

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
To apply the knowledge and skills acquired in previous coursework to solve a specific problem and/or acquire in-depth knowledge on a specific topic. To give the ability to do a literature search. To desing and do experiments having literature knowledge of the students. To teach software technologies to the students in order to do research. To gain skills with individual and groups works of students. To evaluate and interprate the obtained research results and to obtain the project skills having writing.
Teaching Methods and Techniques:
Each student will propose to jury a research proposal for written and oral presentation.
Prerequisites:

Course Coordinator:

Instructors:
Associate Prof. Dr. Duygu KAYA
Assistants:

Recommended Sources

Textbook	:	All the books related with the Electrical and Electronics Engineering field.
Resources	:	
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:	10	**Education**	:	
Engineering	:	40	**Science**	:	
Engineering Design	:	30	**Health**	:	
Social Sciences	:		**Field**	:	20

Course Learning Outcomes

No	Learning Outcomes
C01	Understanding of the applicability of theoretical knowledge
C02	Learning of the group work

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	0	%0
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	0	%40
Project	0	%60
Final examination	0	%0
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	5	70
Hours for off-the-c.r.stud	14	3	42
Assignments	2	3	6
Presentation	3	5	15
Mid-terms	2	5	10
Practice	14	5	70
Laboratory	10	6	60
Project	10	8	80
Final examination	2	4	8
Total Work Load			**361**
ECTS Credit of the Course			**12**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P02	P03	P04	P09
All	5	5	5	5
C01	5	5	5	5
C02	5	5	5	5

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM402	Labor Law				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM402	Labor Law	2	2	2

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
Çalışma hayatındaki sorunlara karşılık hazırlık, Hukuki temel bilgiler
Teaching Methods and Techniques:
İş Hukukuna giriş, Hukukun kaynakları, Hukukun bölümleri, İş hukukunun tanımı, İşçi, İşveren, İşveren vekili, İşyeri ve işletme kavramı, Ferdi iş ilişkilerinin kurulması, Hizmet akdinden doğan borçlar, işçinin iş görmesi, İtaat ve Sadakat, İşverenin ücret ödemesi, İşçiyi gözetme ve eşit işlem borcu, Hizmet akdinin sona ermesi ve kıdem tazminatı, İşin düzenlenmesi çalışma süreleri ve uygulanması, Ücretli tatiller, yıllık ücretli izinler, Kollektif iş ilişkilerine giriş
Prerequisites:

Course Coordinator:

Instructors:
Instructor Kenan SALTIK
Assistants:

Recommended Sources

Textbook	:	Av. Behiç CANTÜRK, İş Hukuku Ders Notları, 2011.
Resources	:	Yargıtay Kararları ve Yüksek Mahkeme, 2011.
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:	80	**Education**	:	
Engineering	:		**Science**	:	
Engineering Design	:		**Health**	:	
Social Sciences	:	20	**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	İş Hukukuna giriş, Temel Hukuk		
2	Hukukun kaynakları, Hukukun bölümleri, İş hukukunun tanımı, İşçi, İşveren, İşveren vekili, İşyeri ve işletme kavramı, İşçini		
3	Ferdi iş ilişkilerinin kurulması, İtaat ve Sadakat, İşverenin ücret ödemesi		
4	Sosyal Güvenlik		
5	Hizmet akdinden doğan borçlar, Sosyal Güvenlik		
6	Sendikalar Hk.		
7	Sendikalar Hk.		
8	ARASINAV		
9	Toplu iş sözleşmesi		
10	Hizmet akdinin sona ermesi ve kıdem tazminatı, Toplu iş sözleşmesi		
11	Hizmet akdinin sona ermesi ve kıdem tazminatı, Grev		
12	İşin düzenlenmesi çalışma süreleri ve uygulanması, Lokavt		
13	Ücretli tatiller, yıllık ücretli izinler, Uzlaşma yolları		
14	Mazeret Sınavı		

Course Learning Outcomes

No	Learning Outcomes
C01	Temel hukuk ve Hukuk kurallarının öğretilmesi
C02	Sosyal güvenlik
C03	Sendikalar ve İş hayatı

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	1	%40
Quizzes	0	%0
Assignment	0	%0
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	2	28
Hours for off-the-c.r.stud	14	2	28
Assignments	0	0	0
Presentation	0	0	0
Mid-terms	1	4	4
Practice	0	0	0
Laboratory	0	0	0
Project	0	0	0
Final examination	1	5	5
Total Work Load			**65**
ECTS Credit of the Course			**2**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P06	P07	P08	P09	P10	P11
All	4	3	3	2	2	5

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM400	High Voltage Technique				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
8	EEM400	High Voltage Technique	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
Static electricity field and electrode systems. Discharge theory. Generating and measurement of high voltages. Over-voltages and traveling waves.
Teaching Methods and Techniques:
Static electricity field and electrode systems. Discharge theory. Generating and measurement of high voltages. Over-voltages and traveling waves.
Prerequisites:

Course Coordinator:

Instructors:
Prof. Dr. Mehmet CEBECİ
Assistants:

Recommended Sources

Textbook	:	
Resources	:	Yüksek Gerilim Deşarj Tekniğine Giriş, Dieter KIND, Çeviren: Prof. Dr. Ahmet RUMELİ, ODTÜ. ,Yüksek Gerilim Tekniği I-II, Prof. Dr. Muzaffer ÖZKA
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:	35	**Education**	:	
Engineering	:	50	**Science**	:	
Engineering Design	:	15	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Fundamental equations of static electricity field.		
2	Electric field and potential calculation at planar, spherical and cylindrical electrode systems		
3	Investigating breakdown and economy of electrode systems		
4	Stratified electrode systems, refraction at boundry surfaces		
5	Regular stress cable and bushings with capacitor		
6	Discharges, ionization and ionization types		
7	Channel discharge theory		
8	Corona on transmission lines		
9	Calculation of corona losses		
10	Generating of high alternative voltages		
11	Generating of high direct voltages		
12	Generating of high pulse voltages, pulse generators ad equivalent circuits		
13	Over-voltages and its features		
14	Traveling waves and its calculation		

Course Learning Outcomes

No	Learning Outcomes
C01	Understanding the fact that isolation is a problem under high voltage electrical fields and learning solution methods of this problem
C02	Comprehending the control of high voltage without damage
C03	Understanding the circuits and operating characteristics required for testing high voltage equipment

Program Learning Outcomes

No	Learning Outcome
P08	Ability to work effectively in disciplinary and multi-disciplinary teams.
P02	Ability to define, formulate and solve complex engineering problems; ability to select and apply appropriate modeling and analysis methods for this purpose.
P07	Professional and ethical responsibility
P06	Ability to communicate effectively in Turkish orally and in writing; knowledge of at least one foreign language.
P01	Sufficient knowledge in mathematics, science and electrical and electronic engineering; ability to apply theoretical and applied knowledge in these fields to engineering problems.
P05	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of engineering problems.
P03	Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; for this purpose, the ability to apply modern design methods
P11	Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age; awareness of the legal consequences of er
P09	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.
P10	Information on project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development.
P04	Ability to develop, select and use modern techniques and tools necessary for engineering practice; Ability to use information technologies effectively.

Assessment		
In-Term Studies	**Quantity**	**Percentage**
Mid-terms	1	%40
Quizzes	0	%0
Assignment	1	%10
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	1	%50
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	14	3	42
Hours for off-the-c.r.stud	14	5	70
Assignments	1	4	4
Presentation	0	0	0
Mid-terms	1	2	2
Practice	0	0	0
Laboratory	0	0	0
Project	0	0	0
Final examination	1	2	2
Total Work Load			**120**
ECTS Credit of the Course			**4**

Course Contribution To Program

Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant

	P01	P02	P03	P04	P11
C01	3	4			
C02			3		2
C03				3	