Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM312		Electromagnetic Waves			
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
6	EEM312	Electromagnetic Waves	3	3	5

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
Electrical and Electronic Engineering with the objective to learn the basics of electromagnetic waves, in the space of uniform plane waves, the behavior of conductors and insulators and learn relevant correlations with them, learn wave guides.
Teaching Methods and Techniques:
Students will be able to: Learn the Maxwell's equations. Learn the basic equations of the waves. Learn proper reflection and refraction of plane waves correlations. Learn uneven planar waves. Learn the wave guide.
Prerequisites:

Course Coordinator:

Instructors:
Associate Prof. Dr. Duygu KAYA
Assistants:

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	Removal of Maxwell's equations and the wave equation.		
2	Basic concepts of waves.		
3	Phase and group velocity, 3D wave propagation, propagation of vector quantities.		
4	In space, smooth planar radiating waves and the conductor insulation.		
5	Electromagnetic spectrum, characteristic impedance and wave number.		
6	Energy density and Poynting theorem.		
7	Uniform plane waves in the plasma emitted and good conductors.		
8	Leather event		
9	Proper reflection and refraction of plane waves.		
10	Fresnel's equations and Snell's law.		
11	Calculation of reflection and transmission coefficient according to the change of the electric field.		
12	Calculation of reflection and transmission coefficient according to the change of the electric field.		
13	Non-uniform plane wave in full reflection, reflection and refraction account the well-conductive surface.		
14	Non-uniform plane wave in full reflection, reflection and refraction account the well-conductive surface.		

Course Learning Outcomes

No	Learning Outcomes
C01	Learn the basics of electromagnetic waves.
C02	Electromagnetic Waves recognize the problems.

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	6	20	120
Hours for off-the-c.r.stud	0	0	0
Assignments	3	10	30
Presentation	0	0	0
Mid-terms	2	3	6
Practice	2	2	4
Laboratory	0	0	0
Project	0	0	0
Final examination	1	2	2
Total Work Load			**162**
ECTS Credit of the Course			**5**

Course Contribution To Program

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

	P01	P02
All	5	4
C01	5	4

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM364	Electric Machinery Laboratory-I				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
6	EEM364	Electric Machinery Laboratory-I	0	1	2

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
EEM-303 Elektrik Makinaları-I dersinde anlatılan konuların deneysel olarak pekiştirilmesine yardımcı olmaktır.
Teaching Methods and Techniques:
İlk iki hafta gruplar belirlenecektir. Daha sonra öğrencilerin ait oldukları gruplar, deney günleri ve laboratuvar kuralları hakkında bilgi verilecektir. Her hafta 7 grup 7 ayrı deney yapacaktır. Bu deneyler gruplar tarafından her hafta dönüşümlü olarak yapılacaktır. Deneylerin başlangıcında deneylerin sorumluları kısa bir sözlü ya da yazılı sınav yapacaktır. Daha sonra deney sorumlusu gözetiminde öğrenciler deneyleri yapacaktır. Sene sonu sınavı yazılı ve laboratuvarda uygulamalı olarak gerçekleştirilecektir. Öğrencilerin sınavda hangi deneyi yapacakları kura ile belirlenecektir.
Prerequisites:
(EEM303)
Course Coordinator:
Associate Prof. Dr. Ahmet ORHAN
Instructors:

Assistants:
Research Assist. Melike ESENResearch Assist. Sertaç YAMANResearch Assist. Abdulcelil KÜLEKÇİOĞLUResearch Assist. F. Rümeysa KÜLEKÇİOĞLUResearch Assist. İrem GÖRGÖZResearch Assist. Merve YILDIRIM

Recommended Sources

Textbook	:	Elektrik Makinaları-I Deney Föyleri
Resources	:	
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:	20	**Education**	:	
Engineering	:	70	**Science**	:	
Engineering Design	:	10	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Deney Gruplarının Belirlenmesi		
2	Laboratuvar hakkında genel bilgi verilmesi		Lab. Föyleri
3	Deney Anlatımı		Lab. Föyleri
4	Deney Anlatımı		Lab. Föyleri
5	Ilgili deneylerin elektrik makinaları laboratuvarında yapılışı		Lab. Föyleri
6	Ilgili deneylerin elektrik makinaları laboratuvarında yapılışı		Lab. Föyleri
7	Ilgili deneylerin elektrik makinaları laboratuvarında yapılışı		Lab. Föyleri
8	Ilgili deneylerin elektrik makinaları laboratuvarında yapılışı		Lab. Föyleri
9	Ilgili deneylerin elektrik makinaları laboratuvarında yapılışı		Lab. Föyleri
10	Ilgili deneylerin elektrik makinaları laboratuvarında yapılışı		Lab. Föyleri
11	Ilgili deneylerin elektrik makinaları laboratuvarında yapılışı		Lab. Föyleri
12	Telafi Deneyleri		Lab. Föyleri
13	Gruplar tarafından hazırlanan deney raporlarının değerlendirilmesi		Lab. raporları
14	Gruplar tarafından hazırlanan deney raporlarının değerlendirilmesi		Lab. raporları

Course Learning Outcomes

No	Learning Outcomes
C01	Öğrenciler temel elektrik makinaları uygulamalarına hakim olacaktır.
C02	Öğrenciler grup ve takım çalışmasını öğrenecektir.
C03	Öğrenciler deney tasarlama, test etme, sonuçları anaiz etme ve deneysel sonuçları yorumlama yeteneği kazanacaktır.
C04	Öğrenci rapor yazmayı öğrenecektir.

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	%40
Project	0	%0
Final examination	1	%60
Total		**% 100**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration**	**Total Work Load**
Course Duration	7	2	14
Hours for off-the-c.r.stud	7	1	7
Assignments	7	2	14
Presentation	0	0	0
Mid-terms	0	0	0
Practice	0	0	0
Laboratory	7	2	14
Project	0	0	0
Final examination	1	1	1
Total Work Load			**50**
ECTS Credit of the Course			**2**

Course Contribution To Program

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

	P01	P03	P05	P06	P08
C01	4	4			
C02					4
C03			5		
C04				3	

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM362	automatic control 2				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
6	EEM362	automatic control 2	2	2	3

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
Ability to measure of performance and methods of analysis in classical control theory. Ability to design control systems by the Root-Locus and frequency response methods. Ability to analyse of control systems in state space.
Teaching Methods and Techniques:
Controllers and main controller structure. Realization PID controller using active circuit components. Design P-PI-PD controllers using root-locus method. Design PID controllers using root-locus method. Design Phase Lead controllers using root-locus method. Design Phase Lag controllers using root-locus method. Design Phase Lag-Lead controllers using root-locus method. Design Phase Lead controllers using Bode diagram. Design Phase Lag controllers using Bode diagram. Determining and tuning of PID controllers parameter using Ziegler-Nichols method based on real time response of the systems.
Prerequisites:

Course Coordinator:

Instructors:
Prof. Dr. Arif Gülten
Assistants:

Recommended Sources

Textbook	:	Otomatik Kontrol Ders Notları- Prof. Dr. Mustafa POYRAZ
Resources	:	
Documents	:	K. OGATA, Englewood Cliffs, NJ: Prentice Hall, 2002. Modern Control Systems, C. D. DORF and R. H. BISHOP, Pearson Educational International, N
Assignments	:	
Exams	:	

Course Category

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

Course Content

Week	Topics	Study Materials	Materials
1	Controller design with using classical methods which use time/frequency response performance criterions of control system		
2	Controllers and main controller structure		
3	Realization PID controller using active circuit components		
4	Design P-PI-PD controllers using root-locus method		
5	Design PID controllers using root-locus method		
6	Design PID controllers using root-locus method		
7	Design Phase Lead controllers using root-locus method		
8	Design Phase Lag controllers using root-locus method		
9	Design Phase Lag-Lead controllers using root-locus method		
10	Design Phase Lag-Lead controllers using root-locus method		
11	Design Phase Lead controllers using Bode diagram		
12	Design Phase Lag controllers using Bode diagram		
13	Determining and tuning of PID controllers parameter using Ziegler-Nichols method based on real time response of the syst		
14	Determining and tuning of PID controllers parameter using Ziegler-Nichols method based on real time response of the syst		

Course Learning Outcomes

No	Learning Outcomes
C01	Students learn the desigin of control systems in time domain
C02	Öğrenciler learn the frequancy domain desigin of control systems.

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	3	42
Assignments	8	2	16
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			**90**
ECTS Credit of the Course			**3**

Course Contribution To Program

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

	P01	P02	P03	P05
All	4	4	4	
C01	4	4	5	4
C02	5	5	5	4

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM358	Microprocessors				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
6	EEM358	Microprocessors	2	3	6

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
The introduction of the microprocessor and microcontroller. teaching the 80286 and PIC16F84 / 16F877 architecture, gaining the ability to write programs in assembly language.
Teaching Methods and Techniques:

Prerequisites:

Course Coordinator:

Instructors:
Asist Prof. Dr. Sencer ÜNALAsist Prof. Dr. Yavuz EROL
Assistants:

Recommended Sources

Textbook	:	Sheet of related experiments
Resources	:	Mikroişlemciler-Mikrobilgisayarlar ve Assembly Programlama,Turhan ÖZKAN, Beta Yayınları, 1994.,PIC Mikrodenetleyiciler 16F84A & 16f628A, Feyzi
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	Binary number systems, arithmetic units, accumulator logic, CPU, RAM, ROM, EEPROM concepts, differences between micr		
2	Memory basics and memory organization, 8085 8-bit microprocessor structure, 8085 hardware and software architecture, t		
3	16-bit microprocessors, introduction to 80286 microprocessors, the address bus, register structure, segmented memory str		
4	The addressing modes at 80286 microprocessors, data addressing modes, programme memory addressing.		
5	Basic 80286 commands (data transfer command, arithmetic and logic command, addition, subtraction, division, multiplicati		
6	Stack and subprograms, string comparison, programme check commands, branching commands.Experiment 2: Stack and s		
7	Digital / analog conversion and 80286 microprocessor software programming examples.Experiment 3: Optical and ultrason		
8	Digital / analog conversion.Experiment 4: DAC applications in 80286 microprocessor.		
9	Analog /digital conversion.Experiment 5: ADC applications in 80286 microprocessor.		
10	Introduction to interrupt, software interrupt, hardware interrupt.Experiment 6: Interrupt applications in 80286 microproces		
11	Microcontroller family, PIC microcontroller hardware structure, the commands applied on byte, the commands applied on b		
12	Flash, RAM, addressing modes, the concept of changing banks, ports, special purpose registers.Experiment 7: PIC microco		
13	Environmental interface concept, environmental interrupts.Experiment 8: PIC microcontroller applications -2 (interrupts).		
14	Time delay, timer interrupts, counters, microcontroller programming examples.		

Course Learning Outcomes

No	Learning Outcomes
C01	qain the ability to design a system process
C02	qain the ability to interpret and designing, experiments, analyzing experiment results
C03	will have the ability to use modern tools, techniques and methods required for engineering applications

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	%30
Quizzes	0	%0
Assignment	1	%10
Attendance	0	%0
Practice	0	%0
Project	1	%15
Final examination	1	%45
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	3	42
Assignments	3	6	18
Presentation	0	0	0
Mid-terms	1	2	2
Practice	0	0	0
Laboratory	14	3	42
Project	1	20	20
Final examination	1	2	2
Total Work Load			**182**
ECTS Credit of the Course			**6**

Course Contribution To Program

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

	P03	P04	P05
All	4	3	3
C01	4		
C02			3
C03		3	

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM356	ELECTROMECHANICAL CONTROL CIRCUITS				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
6	EEM356	ELECTROMECHANICAL CONTROL CIRCUITS	2	2	3

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
Students learn the controls and installation of single phase and three-phase asynchronous motors running, starting, changing direction of rotation and braking transactions and other electromechanical will acquire the knowledge and skills to solve problems.
Teaching Methods and Techniques:

Prerequisites:

Course Coordinator:

Instructors:
Prof. Dr. Yakup DEMİR
Assistants:

Recommended Sources

Textbook	:	
Resources	:	Kumanda Devreleri (1), Yavuz TÜRKMEN, Ceyhan GEÇTAN, 1992. ,Kumanda Devreleri (2), Yavuz TÜRKMEN, Ceyhan GEÇTAN, 1992.
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	Overview to industry. The importance of the electric motor in the industry.		
2	Elements and features that are used in electrical control circuit.		
3	Packet switches, pushbuttons, indicator lamps, switches and limit switches.		
4	Time relays, contactors and relays.		
5	Motor protection relays and fuses.		
6	Standard used in the control circuit.		
7	Electrical control design and material selection.		
8	The current schemes and power circuits.		
9	The current schemes and power circuits.		
10	Starting methods for induction motors.		
11	In motors braking.		
12	Lighting and motor compensation.		
13	Automatic control systems created using different control elements.		
14	Reactive power compensation.		

Course Learning Outcomes

No	Learning Outcomes
C01	Recognizes and assembles control elements.
C02	Motors give way to know the methods and implements.
C03	Control circuit design for solving control problems apply.

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	%20
Quizzes	0	%0
Assignment	1	%20
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	3	42
Assignments	3	4	12
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			**86**
ECTS Credit of the Course			**3**

Course Contribution To Program

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

	P03	P04
All	3	3
C01	3	3
C02	3	3
C03	3	3

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM354		Electric Energy Generation Systems			
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
6	EEM354	Electric Energy Generation Systems	2	2	3

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
Learning principles of electrical energy generation; power plant types, their structural characteristics and work (running). Be able to calculate the amount of electrical energy produced from energy sources. Be able to learn the design calculations of elements (components) of the plants.
Teaching Methods and Techniques:
Conventional and renewable energy sources. Hydroelectric power plants and classification of HPP. Water intake construction of HPP. Hydraulic turbine types. Frequency and voltage stability in the power plants. Thermal power plants. Obtaining electricity from solar energy. Wind power plants and types of wind turbines. Diesel power plants. Fuel Cells, hydrogen production and storage.Nuclear power plants. Energy production in power plants and statistics. Daily load and energy curves.
Prerequisites:

Course Coordinator:

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

Recommended Sources

Textbook	:	Asst. Prof. Dr. Mahmut Temel Özdemir's lecture notes and power point presentations.
Resources	:	Hidroelektrik Santralar. Hesap Esasları ve Projelendirilmesi, Kadir YILDIZ, DSİ Vakfı, 1992. Elektrik Enerjisi Üretim Santralleri, Behçet KOCAMAN, Bi
Documents	:	
Assignments	:	
Exams	:	

Course Category

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

Course Content

Week	Topics	Study Materials	Materials
1	Conventional, New and Renewable Energy Sources		Lecture Notes, power point presentation
2	Classification of Hydroelectric Power Plants. Power calculation of HPP.		Lecture Note, power point presentations
3	Water intake construction of HPP: trashrack, cover, valve ,surge tank, power tunnel, penstock.		Lecture notes, power point presentation
4	Hydraulic turbine types: Kaplan, Francis and Pelton turbines. Structural features.		Lecture notes, power point presentation
5	Water turbine and vortex cavitation phenomena.		Lecture notes, power point presentation
6	Frequency and voltage stability in the power plants (speed and voltage regulation).		Lecture notes, power point presentation
7	Thermal power plants; January, boilers, pressure steam systems, condensers and cooling towers.		Lecture notes, power point presentation
8	Calculation of confiscation and easement fields.		Lecture notes, power point presentation
9	Obtaining electricity from solar energy. Photovoltaic and solar systems, solar power plants.		Lecture Notes, power point presentation
10	Wind power plants. And types of wind turbines. Wind plant components		Lecture notes, power point presentation
11	Diesel power plants. Work and properties.		Lecture Notes, Power point presentation
12	Fuel Cells, hydrogen production and storage.		Lecture notes, power point presentation
13	Nuclear power plants. Working features. Nuclear waste and environment. Safety.		Lecture notes, power point presentation
14	Energy production in power plants and statistics. Daily load and energy curves.		Lecture notes, power point presentation

Course Learning Outcomes

No	Learning Outcomes
C01	The students will learn energy production process and operation and construction of different type power plants
C02	In this course, the students will learn conventional and renewable energy sources usage in energy production. They will able to analyze economical enviromental effects of different energy sources

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	2	28
Hours for off-the-c.r.stud	14	4	56
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			**92**
ECTS Credit of the Course			**3**

Course Contribution To Program

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

	P01	P11
All	4	3
C01	4	
C02	4	3

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM352	Filter Design Methods				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
6	EEM352	Filter Design Methods	2	2	3

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Seçmeli
Goals:
To learn filter design methods and and to design a filter that provides the desired transfer function.
Teaching Methods and Techniques:
Review of continuous-time signals and systems. Concept of filtering. Phase and gain responses. Butterworth, Chebyshev, elliptic, filters., etc. Frequency transformations. Synthesis of passive filter networks. Active filters.
Prerequisites:

Course Coordinator:

Instructors:
Associate Prof. Dr. Turgay KAYA
Assistants:

Recommended Sources

Textbook	:	Introduction to Filter Theory, David E.Johnson,Prentice-Hall., Englewood Cliffs, New Jersey.
Resources	:	Devre Sentezi Ders Notları , Fuat Anday, İ.T.Ü.,İstanbul
Documents	:	
Assignments	:	
Exams	:	

Course Category

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

Course Content

Week	Topics	Study Materials	Materials
1	Review of continuous-time signals and systems		
2	Foster and Cauer circuits		
3	Foster and Cauer circuits and sample applications		
4	The properties of LC, RC and RL type function		
5	The properties of LC, RC and RL type function		
6	The Cauer Conversions		
7	Perform single-ended		
8	Perform single-ended		
9	Butterworth and Chebyshev filter		
10	Butterworth and Chebyshev filter		
11	Scalable function of the circuit		
12	Zero Shift		
13	Zero shift		
14	Active filters		

Course Learning Outcomes

No	Learning Outcomes
C01	Analog filter design
C02	Circuit design to provide the desired transfer function

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	5	5	25
Assignments	5	1	5
Presentation	3	2	6
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			**82**
ECTS Credit of the Course			**3**

Course Contribution To Program

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

	P01	P02	P04
All	4	4	5
C01	4	4	5
C02	4	4	5

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM348	ELECTRICAL INSTALLATIONS				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
6	EEM348	ELECTRICAL INSTALLATIONS	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
Realization of basic topics and principles of power systems.
Teaching Methods and Techniques:
Introduction to power systems. Generation, transmission and distribution voltages. General structure, units and properties of a generation institution. Power transmission line. Nominal ? and nominal T circuits. Calculations of resistance, inductance and capacitance on transmission lines Mechanical structure of transmission lines. Conductors and it's properties. Stranded and bunched conductors. LV, MV and HV cables. Insulators, it's structure, types and properties. Potential distributions on insulators. Mid term Selection criterias of pillars. Calculation and selection of pillar on LV distribution lines. Power switches; disconnector types and it's properties. Breaker types and it's properties and interrupt techniques. Bus bar and bus bar systems. Short circuit currents and it's properties. Calculation and selection of the breaker according to short circuit current. Dimensioning of bus bar and cables according to short circuit currents.
Prerequisites:

Course Coordinator:

Instructors:
Prof. Dr. Mehmet CEBECİ
Assistants:

Recommended Sources

Textbook	:	Handouts of power systems prepared by Prof.Dr. Mehmet Cebeci and power point presentations.
Resources	:	Elektrik Enerjisi Dağıtımı, Nusret ALPERÖZ, 1987. Enerji İletimi, Prof. Dr. Hüseyin ÇAKIR, YTÜ Yayını, 1989. Enerji Hatları Mühendisliği, H. Hüsnü D
Documents	:	
Assignments	:	
Exams	:	

Course Category

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

Course Content

Week	Topics	Study Materials	Materials
1	Introduction to power systems. Generation, transmission and distribution voltages.		
2	General structure, units and properties of a generation institution.		
3	Short and medium length transmission lines and equivalent circuits		
4	Conductors and it's properties. Stranded and bundled conductors.		
5	LV, MV and HV cables.		
6	Voltage drop and power loss calculations in distribution lines		
7	Insulators, it's types, properties and selection criteries		
8	LV, MV and HV poles. Criters for selection of poles on LV distribution lines.		
9	Power switches; disconnector types and it's properties. Breaker types and it's properties and interrupt techniques.		
10	Measurement transformers		
11	Bus bar and bus bar systems.		
12	Short circuit currents and it's properties. Calculation and selection of the breaker according to short circuit current. Dimens		
13	Dimensioning of bus bar and cables according to short circuit currents.		
14	Grounding		

Course Learning Outcomes

No	Learning Outcomes
C01	To learn about the structure, operation and design parameters of various tools and equipment used in electrical installations.
C02	To be able to calculate the short circuit currents in electrical facilities and to choose the appropriate equipment
C04	Understanding of the relevant regulations

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	2	2
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			**118**
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	P07
C01			4	
C02	3	4		
C04				3

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM346	Electronic Lab.-2				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
6	EEM346	Electronic Lab.-2	0	1	2

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
Students learns to obtain characteristics and the behavior of the main components used in electronics and their comparison with the theoretical results with the sample application circuits. To increase the ability to measure information and success as a group to overcome a problem. Develop the ability to use simulation programs related to electronic applications
Teaching Methods and Techniques:

Prerequisites:
(EEM315)
Course Coordinator:

Instructors:
Asist Prof. Barış KARAKAYA
Assistants:
Research Assist. Sertaç YAMANResearch Assist. Esra İNCE

Recommended Sources

Textbook	:	Related experiments sheets
Resources	:	Experiment 1: Clipper and Clamper Circuits
Documents	:	Experiment 2: Examination of the Zener diode
Assignments	:	Experiment 3: Rectifier Circuits
Exams	:	Experiment 4: Transistor Amplifiers Experiment 5: FET Amplifiers

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	Establishment of experimental group and making related announcements		
2	Made courses related to laboratory rules and functioning		
3	Made courses related to content of experiments		
4	Made courses related to content of experiments		
5	Made courses related to content of experiments		
6	Week 1 : to be performed to the relevant group of experiment 1 - experiment 8		
7	Week 2: to be performed to the relevant group of experiment 1 - experiment 8		
8	Week 3 : to be performed to the relevant group of experiment 1 - experiment 8		
9	Week 4 : to be performed to the relevant group of experiment 1 - experiment 8		
10	Week 5 : to be performed to the relevant group of experiment 1 - experiment 8		
11	Week 6 : to be performed to the relevant group of experiment 1 - experiment 8		
12	Week 7 : to be performed to the relevant group of experiment 1 - experiment 8		
13	Week 8 : to be performed to the relevant group of experiment 1 - experiment 8		
14	Experiment weeks for the students who have an excuse.		

Course Learning Outcomes

No	Learning Outcomes
C01	The students will gain work ability in a group individual
C02	They will gain ability of designing experiment, experimenting, analyzing empirical results and interpretation of the experimental results.
C03	They will gain the ability to use tools, methods and Techniques required for engineering applications.

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	1	14
Assignments	0	0	0
Presentation	0	0	0
Mid-terms	1	2	2
Practice	0	0	0
Laboratory	14	1	14
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	P06
C01			3
C02		5	
C03	3		

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM344	Computer Analysis in EEE				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
6	EEM344	Computer Analysis in EEE	4	3	6

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
1. Matlab Paket programının mühendislik problemlerine uygulanması 2. Sayısal analiz yöntemlerinin öğrenilmesi ve bilgisayar uygulamaları
Teaching Methods and Techniques:
Matlab paket programının tanıtılması ve kullanılması. Hata analizi, lineer denklem çözümleri. Denklem takımlarının doğrusal çözümleri. Denklem takımlarının iteratif çözümü. Nonlineer denklemlerin çözümü. Enterpolasyon. Sayısal türev. Sayısal integral. Adi diferansiyel denklemlerinin çözümü. Kısmi diferansiyel denklemlerinin çözümü. En küçük kareler yöntemi ile eğri uydurma.
Prerequisites:

Course Coordinator:

Instructors:
Asist Prof. Dr. Sencer ÜNALAsist Prof. Barış KARAKAYA
Assistants:

Recommended Sources

Textbook	:	
Resources	:	
Documents	:	Sayısal Analiz ve Mühendislik Uygulamaları, İrfan Karagöz, 3. Baskı, Nobel Akademi Yayınları. Introduction to Numerical Analysis Using MATLAB, Riz
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	Matlab paket programının tanıtılması ve kullanılması.		
2	Matlab paket programının tanıtılması ve kullanılması.		
3	Matlab paket programının tanıtılması ve kullanılması.		
4	Matlab paket programının tanıtılması ve kullanılması.		
5	Sayısal Analize giriş. Hata kavramı ve hata analizi.		
6	Lineer denklem sistemlerinin sayısal çözümleri.		
7	Lineer denklem sistemlerinin sayısal çözümleri.		
8	Lineer olmayan denklem sistemlerin sayısal çözümleri.		
9	Enterpolasyon		
10	Sayısal Türev ve uygulamaları		
11	Sayısal İntegral ve uygulamaları		
12	Adi diferansiyel denklemlerin sayısal çözümleri		
13	Kısmi diferansiyel denklemlerin sayısal çözümleri		
14	En küçük kareler yöntemi ile eğri uydurma		

Course Learning Outcomes

No	Learning Outcomes
C01	Elektrik mühendisliğindeki problemleri MATLAB paket programı ile çözmek
C02	Yaygın Sayısal Analiz yöntemlerini öğrenmek ve programlamak.

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	4	56
Assignments	12	3	36
Presentation	0	0	0
Mid-terms	1	2	2
Practice	14	2	28
Laboratory	14	2	28
Project	0	0	0
Final examination	1	2	2
Total Work Load			**180**
ECTS Credit of the Course			**6**

Course Contribution To Program

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

	P01	P02	P04
All	4	4	3
C01	4	4	3
C02		3	3

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM314	Analog Communications				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
6	EEM314	Analog Communications	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
To develop an understanding of the fundamental stages of a communication system, such as modulators and demodulators, and how they work. To introduce mathematical tools and concepts, such as Hilbert transform, and ways to obtain more manageable representations of pass-band signals and systems.
Teaching Methods and Techniques:
Ability to use transforms domain analysis to understand the concept of modulation, the need for modulation, and its effect on spectra of signals. Ability to appreciate the need for effective use of scarce resources such as power and bandwidth, and the trade-offs in system design. Ability to design and implement basic modulator and demodulator circuits, simulate modulation and demodulation techniques, and their performance in noise.
Prerequisites:

Course Coordinator:

Instructors:
Associate Prof. Dr. Turgay KAYA
Assistants:

Recommended Sources

Textbook	:	
Resources	:	Basic Communication Theory, J. E. PEARSON, Prentice Hall, 1993. Principles of Communication Systems, H. TAUB and D. L. SCHILLING, McGraw-H
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	Introduction to communication systems.		
2	Communication systems and the remarkable cases for communication system design.		
3	Filters and obtaining theirs transfer functions		
4	Signals and modulation		
5	Types of base band signals		
6	The necessity of modulation and the classification of modulation types. The advantages obtained with modulation.		
7	Theory of Amplitude Modulation (AM), types and obtaining of mathematical equalities.		
8	Amplitude modulation modulators and demodulators		
9	Theory of Frequency Modulation (AM), types obtaining of mathematical equalities, advantages and disadvantages		
10	Phase modulation theory and general analysis		
11	The comparing of FM and PM		
12	FM stereo.		
13	Superheterodin receivers		
14	Solution of problems		

Course Learning Outcomes

No	Learning Outcomes
C01	Learn the communication system
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	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	1	5	5
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

	P01	P02
C01	4	
C02		3

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM308	Power Electronics				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
6	EEM308	Power Electronics	3	3	5

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
In this course the students will get familiar to the power electronic devices and will be able to apply their ability of mathematics, science and engineering knowledge to the power electronic circuits and their protection. They will be able to describe, model, formulate and solve the power electronics problems.
Teaching Methods and Techniques:
Introduction to power electronics, related topics. Semiconductor devices: Diode, Thyristor, Triac, Power Transistor, MOSFET, IGBT, GTO, MCT, SIT, IGCT, MOS turn-off , Thyristor. Calculation of losses in power semiconductor devices; (conduction loss, switching loss). Heat sink design. Design of snubber circuits. Gate drive circuits and isolation. Single phase AC choppers. Rectifiers. Single phase uncontrolled (diode) bridge rectifiers. Smoothing methods. Power factors. Single phase controlled (thyristor) bridge rectifiers. Analysis of Three phase half-bridge uncontrolled(diode) / controlled (Thyristor) rectifiers. Free wheeling operation. Three phase full-bridge uncontrolled (diode) rectifiers. Characteristics of line current. Three phase full-bridge controlled (Thyristor) rectifiers. DC thyristor choppers. Two-Thyristor DC chopper. Resonance commutation DC chopper. Single Phase Inverter. Voltage and frequency control methods of the single-phase inverter: quasi-square wave and PWM techniques. Analyze of the single phase inverter. Harmonic analysis. Modulation index, frequency ratio.
Prerequisites:

Course Coordinator:

Instructors:
Prof. Dr. Hasan KÜRÜM
Assistants:

Recommended Sources

Textbook	:	Handouts of power electronics prepared by Prof.Dr. Hasan KÜRÜM. Power point presentations.
Resources	:	Hacı BODUR, Güç Elektroniği, Birsen Yayınevi, Güncelleştirilmiş Baskı 2012.,Muhammad H. RASHID, Power Electronics, Pearson, 2014.,Bimal K. Bo
Documents	:	
Assignments	:	
Exams	:	

Course Category

Mathmatics and Basic Sciences	:	20	**Education**	:	
Engineering	:	60	**Science**	:	
Engineering Design	:	20	**Health**	:	
Social Sciences	:		**Field**	:	

Course Content

Week	Topics	Study Materials	Materials
1	Introduction to power electronics, related topics. Semiconductor devices: Diode, Thyristor		Handouts.
2	Triac, Power Transistor, MOSFET, IGBT, GTO, MCT, SIT, IGCT, MOS turn-off , Thyristor.		Handouts.
3	Calculation of losses in power semiconductor devices; (conduction loss, switching loss). Heat sink design. Design of snubbe		Handouts.
4	Gate drive circuits and isolation. Single phase AC choppers.		Handouts.
5	Rectifiers. Single phase uncontrolled (diode) bridge rectifiers.		Handouts.
6	Smoothing methods. Power factors. Single phase controlled (thyristor) bridge rectifiers.		Handouts.
8	Inversion, analysis of Three phase half-bridge uncontrolled(diode) / controlled (Thyristor) rectifiers.		Handouts.
9	Free wheeling operation. Three phase full-bridge uncontrolled (diode) rectifiers.		Ders notları.
10	Characteristics of the line current. Three phase full-bridge controlled (Thyristor) rectifiers.		Handouts.
11	Three-Phase half-controlled rectifiers. DC thyristor choppers. Two-Thyristor DC chopper.		Handouts.
12	Resonance commutation DC chopper.		Handouts.
13	Single Phase inverter. Voltage and frequency control methods of the single-phase inverter.		Handouts.
14	quasi-square wave and PWM techniques. Analyze of the single phase inverter. Harmonic analysis. Modulation index, freque		Handouts.

Course Learning Outcomes

No	Learning Outcomes
C01	In this course the students will be able to apply their ability of mathematics, science and engineering knowledge to the power electronic circuits
C02	The students will be able to describe, model, formulate and solve the power electronics problems.

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	%45
Quizzes	1	%0
Assignment	0	%5
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	6	84
Assignments	1	6	6
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			**136**
ECTS Credit of the Course			**5**

Course Contribution To Program

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

	P01	P02
C01	5	
C02		5

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM306	Power Systems-2				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
6	EEM306	Power Systems-2	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
Identify the components of power systems. Learning draw by calculating reactance diagrams. To be able to make the power system fault analysis using symmetrical components. Learning the bus and cable choices by necessary calculation and criteria.
Teaching Methods and Techniques:
Components of power system. Diagrams of reactance and impedance. Power system faults. Faults analyzing by symmetrical components.
Prerequisites:

Course Coordinator:

Instructors:
Prof. Dr. Muhsin Tunay GENÇOĞLU
Assistants:

Recommended Sources

Textbook	:	Elektrik Güç Sistemleri Analizi, Hüseyin ÇAKIR, YTÜ Yayınları, 1986. Güç Sistemlerinin Bilgisayar Destekli Analizi, Uğur ARİFOĞLU, Alfa Yayınları, 20
Resources	:	AC-DC Power System Analysis, J. ARRILLAGA and B. C. SMITH, IEE Power & Energy Series, 1998. ,Power System Analysis and Design, J. Duncan
Documents	:	
Assignments	:	
Exams	:	

Course Category

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

Course Content

Week	Topics	Study Materials	Materials
1	Construction and presentation of power systems. Single line, impedance and reactance diagrams.		
2	Per unit (p.u.) values. Selection and change of base for p.u. values. Sample calculations.		
3	Symmetrical tree phase faults in synchronous machines. Investigation of a synchronous generator in short circuit.		
4	Reactances and short circuit currents of the synchronous machines.		
5	Internal voltages of loaded machines under transient conditions. Calculation with thevenin equivalent circuit.		
6	Symmetrical components. Symmetrical components of asymmetrical phases, operators, power in symmetrical components.		
7	Series impedances of circuit elements, series circuits of unloaded generators.		
8	Simetrili bileşenler. Simetrili bileşenlerde güç.		
9	Asymmetrical and symmetrical faults in power systems.		
10	Connection of series circuit according to fault types.		
11	Grounding and grounding types.		
12	Grounding types and potential arrangement.		
13	Effect of the star point state to grounding.		
14	Effect of the star point state to grounding.		

Course Learning Outcomes

No	Learning Outcomes
C01	Power systems single line
C02	calculation ...
C03	fualt analayzes
C04	Analayzes of fault synchronous generator...

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	%30
Quizzes	0	%0
Assignment	2	%10
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	5	5
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			**121**
ECTS Credit of the Course			**4**

Course Contribution To Program

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

	P02
C01	4
C03	4
C04	3

Firat University

FACULTY OF ENGINEERING
ELECTRICAL-ELECTRONICS ENGINEERING

EEM304	Electrical Machines-2				
Semester	**Course Code**	**Course Name**	**L+P**	**Credit**	**ECTS**
6	EEM304	Electrical Machines-2	3	3	4

Language of Instruction:
Turkish
Course Level:
Faculty
Work Placement(s):
No
Department / Program:
ELECTRICAL-ELECTRONICS ENGINEERING
Course Type:
Zorunlu
Goals:
The aim of this module is to provide an introduce to the basic concepts and techniques of AC electrical machines. The other aim is to transient and steady state analysis of AC Machines
Teaching Methods and Techniques:
AC Machine Fundamentals; The Rotating Magnetic Field; Magneto motive Force and Flux Distribution in AC Machines, Induced Voltage in Ac Machines; Induced Torque in AC Machines; Distributed Windings in AC Machines; Power Flows and Losses of AC Machine; Construction of Synchronous Generator Induction voltage at the Synchronous Generator; The Equivalent Circuit of Synchronous Generator; The Phasor Diagram of Synchronous Generator; Power and Torque in Synchronous Generator, Measuring Synchronous Generator Model Parameters; Local and Parallel Operation of Synchronous Generators and its transients analysis. Steady State Operation and fundamental study analysis of Synchronous Motors Starting synchronous Motors; introduction to Induction Motors; The Equivalent Circuit of Induction Motors; Power and Torque of Induction Motor; Torque-Speed characteristics; Mid term Determining Circuit Model Parameters of Induction Motors; introduction to Induction Generator; Local Operation of Induction Generators ; Single Phase And Special Purpose Motors; The Universal Motors; Single Phase Induction Motors; Speed Control of Single Phase Induction Motors; Stepper Motors; Working principle and driver circuits.
Prerequisites:

Course Coordinator:

Instructors:
Associate Prof. Dr. Ahmet ORHAN
Assistants:

Recommended Sources

Textbook	:	Theory and Problems of Electric Machines and Electromechanic, Syed A. NASAR. Electric Machinery Fundamentals, Stephan J. CHAPMAN, McGraw-I
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	AC Machine Fundamentals; The Rotating Magnetic Field;		
2	Magneto motive Force and Flux Distribution in AC Machines, Induced Voltage in Ac Machines; Induced Torque in AC Machi		
3	Power Flows and Losses of AC Machine; Construction of Synchronous Generator		
4	Asenkron motorlarda güç ve moment-hız karakteristiklerinin analizi.		
5	Asenkron motor tasarımındaki yönelimler ve tasarım sınıfları.		
6	Asenkron motorlara yol verme ve hız kontrolü. Asenkron generatör.		
7	Tek fazlı asenkron motorlar. Tek fazlı asenkron motorların çift döner alan teorisi.		
8	Tek fazlı motorlarda yol verme. Gölge kutuplu motorlar.		
9	Ara sınav		
10	Senkron generatörler; senkron generatörlerin eşdeğer devreleri, fazör diyagramı, güç ve moment ifadeleri.		
11	Senkron generatörlerin lokal ve paralel çalışması. Senkron generatörlerin geçici durum analizi.		
12	Senkron motorların sürekli durum analizleri.		
13	Senkron motorlara yol verme.		
14	Adım motorları.		

Course Learning Outcomes

No	Learning Outcomes
C02	Ability to identify, formulate, and solve basic engineering and civil engineering problems, to select and apply appropriate methods and techniques for this purpose.
C03	Ability to design a system, component or process to meet the specific needs and requirements, ability to apply modern methods in this direction.

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	6	12	72
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			**118**
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
C02	4	
C03		3