Elektrik Elektronik Mühendisliği Bölümü Vizyon ve Misyon

Vizyon

Ankara Bilim Üniversitesi Elektrik-Elektronik Mühendisliği Bölümü modern dünyanın ihtiyaçlarını öngörerek mezunlarının, bilginin teknolojiye, teknolojinin de ürün ve uygulamaya dönüşümünde ulusal ve uluslararası ölçekte aktif görev alabilecek, nitelikli mühendisler olmasını amaçlamaktadır.

Vision

The Department of Electrical and Electronics Engineering of Ankara Bilim University foresees the needs of the modern world, and aims at graduates to be qualified engineers who can take an active role on a national and international scale in the transformation of information into technology and technology into product.

Misyon

Bölümümüzün öncelikli hedefleri arasında, mesleğini severek yapan, özgüveni tam, proje odaklı, teknolojinin gelişmesine ayak uyduran uygulamalı eğitim modeli ile mühendisler yetiştirmek yer almaktadır. Bölümümüz, öğrencilerimize bilimin yeni kapılarını açacak ve teknolojinin modern dünyası ile tanışmasını sağlayacaktır. Bu kapsamda bir mühendislik ekolü oluşturma prensibi ile yolumuza devam etmekteyiz.

Mission

The primary objectives of our department are to educate engineers with a training model that enjoys their profession, is fully self-confident, project-oriented, and keeps up with the development of technology. Our department will open up doors of science in technology and enable the student to meet the modern world of technology. In this context, we aim to create one of the leading engineering schools

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT
FOUR YEAR CURRICULUM

First Semester					
Course Code	**Course Name**	**T**	**P**	**UC**	**ECTS**
CENG 101	Algorithms and Programming with Java I	3	2	4	6
ENG 101	Academic English I	2	0	2	2
MATH 101	Calculus I	4	0	4	6
PHY 101	Physics I	3	2	4	6
EEE 103	Molecular Biology and Biochemistry	3	0	3	5
HIS 101/ HIS 501	Principles of Ataturk and History of Revolutions I	2	0	2	2
TUR 101/ TUR 501	Turkish I	2	0	2	2
OHS 101	Occupational Health and Safety I	1	0	1	1
TOTAL		**20**	**4**	**22**	**30**

Second Semester					
Course Code	**Course Name**	**T**	**P**	**UC**	**ECTS**
EEE 102	Introduction to EEE	2	0	2	3
OHS 102	Occupational Health and Safety II	1	0	1	1
ENG 102	Academic English II	2	0	2	2
MATH 102	Calculus II	4	0	4	6
PHY 102	Physics II	3	2	4	6
HIS 102/ HIS 502	Principles of Ataturk and History of Revolutions II	2	0	2	2
TUR 102/ TUR 502	Turkish II	2	0	2	2
CENG 102	Algorithms and Programming with Java II	3	4	5	8

TOTAL	**19**	**6**	**22**	**30**

Third Semester					
Course Code	**Course Name**	**T**	**P**	**UC**	**ECTS**
MATH 201	Engineering Mathematics I	4	0	4	6
EEE 201	Circuit Theory I	4	2	5	6
MATH 203	Advanced Mathematics	3	0	3	5
EEE 203	Digital Design	3	2	4	5
EEE 205	Computer Tools for Electrical Engineering	2	1	2	3
ENG 201	Communication Techniques I	2	0	2	2
ELEC 201	Non-Departmental Elective	3	0	3	3
TOTAL		**21**	**5**	**23**	**30**

Fourth Semester					
Course Code	**Course Name**	**T**	**P**	**UC**	**ECTS**
MATH 204	Engineering Mathematics II	4	0	4	6
EEE 202	Circuit Theory II	4	2	5	6
EEE 208	Signal and Systems	3	0	3	4
EEE 206	Electromagnetic Field Theory	3	0	3	4
EEE 204	Electronics I	3	2	4	5
ENG 202	Communication Techniques II	2	0	2	2
ELEC 202	Non-Departmental Elective	3	0	3	3
TOTAL		**18**	**4**	**24**	**30**

Fifth Semester					
Course Code	**Course Name**	**T**	**P**	**UC**	**ECTS**
EEE 301	Telecommunications I	3	2	4	6
EEE 303	Electromagnetics Wave Theory	3	0	3	5
EEE 305	Electronics II	3	2	4	6
EEE 307	Electromechanical Energy Conversion I	3	2	4	5
EEE 309	Digital Signal Processing	3	2	4	5
ENG 301	Academic and Occupational Writing Skills I	2	0	2	2
EEE 399	Summer Practice	0	0	1	1
TOTAL		**17**	**8**	**22**	**30**

Sixth Semester					
Course Code	**Course Name**	**T**	**P**	**UC**	**ECTS**
EEE 302	Telecommunications II	3	2	4	5
EEE 304	Control Systems I	3	2	4	5
EEE 306	Microprocessors	3	2	4	5
ENG 302	Academic and Occupational Writing Skills II	2	0	2	2
	Technical Elective-3XX	3	0	3	5
	Technical Elective-3XX	3	0	3	5
ELEC 301	Non-Departmental Elective	3	0	3	3
TOTAL		**20**	**6**	**23**	**30**

Seventh Semester					
Course Code	**Course Name**	**T**	**P**	**UC**	**ECTS**
EEE 401	Graduation Project I	3	2	3	5

	Technical Elective-4XX	3	0	3	5
	Technical Elective-4XX	3	0	3	5
	Technical Elective-4XX	3	0	3	5
	Technical Elective-4XX	3	0	3	5
ELEC 401	Non-Departmental Elective	3	0	3	3
CCE401	Critical Thinking, Creativity and Entrepreneurship	2	0	2	2
TOTAL		**20**	**2**	**20**	**30**

Eighth Semester					
Course Code	**Course Name**	**T**	**P**	**UC**	**ECTS**
EEE 402	Graduation Project II	3	2	4	5
EEE 403	Work Placement	0	25	6	25
TOTAL		**3**	**27**	**10**	**30**

Technical Elective- 3XX					
Course Code	**Course Name**	**T**	**P**	**UC**	**ECTS**
EEE 310	Electromechanical Energy Conversion II	3	2	4	5
EEE 312	Utilisation of Electrical Energy	3	0	3	5
EEE 314	Optical Fiber Communications	3	0	3	5
EEE 316	Microwave Engineering	3	0	3	5
EEE 318	Matlab Applications in Electrical Engineering	3	0	3	5
EEE 320	Neural Networks	3	0	3	5
EEE 322	Programmable Logic Controller	3	0	3	5

Technical Elective -4XX					
Course Code	**Course Name**	**T**	**P**	**UC**	**ECTS**
EEE 450	Antennas and Propagation	3	2	4	5

EEE 451	Microwave Electronics	3	0	3	5
EEE 452	Satellite Communications	3	0	3	5
EEE 453	CMOS VLSI Design, HDL	3	2	4	5
EEE 454	Photonics	3	0	3	5
EEE 455	Wireless Networking Technologies and Applications	3	0	3	5
EEE 456	Digital Image Processing	3	0	3	5
EEE 457	Introduction to Robotics	3	0	3	5
EEE 458	Medical Imaging	3	0	3	5
EEE 459	Biomedical Signals and Instrumentation	3	0	3	5
EEE 460	Fundamentals of Biomedical Engineering	3	0	3	5
EEE 461	Biosignal Processing	3	0	3	5
EEE 462	Embedded System Design	3	0	3	5
EEE 463	Computational Neuroscience	3	0	3	5
EEE 464	Electronic Systems of UAV	3	0	3	5
EEE 465	Electronic Defense Systems	3	0	3	5
EEE 466	Control Systems II	3	0	3	5
EEE 467	System Modeling and Simulation	3	0	3	5
EEE 468	Numerical Methods in EE	3	0	3	5
EEE 469	Coding Theory	3	0	3	5
EEE 470	Information Theory	3	0	3	5
EEE 471	High Voltage Techniques	3	0	3	5
EEE 472	Power System Analysis	3	0	3	5
EEE 473	Distribution Systems	3	0	3	5
EEE 474	Audio Engineering and Acoustics	3	0	3	5
EEE 475	Digital Broadcasting and Transmission	3	0	3	5
EEE 476	Artificial Intelligence	3	0	3	5
EEE 477	Mobile Communications	3	0	3	5
EEE 478	Broadband Digital Communications	3	0	3	5
EEE 479	Machine Vision	3	0	3	5
EEE 480	Laser and Industrial Applications	3	0	3	5

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FACULTY OF ENGINEERİNG AND ARCHITECTURE
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE NAME

Course Name	EEE 102 – Introduction to EEE
Course Type	Compulsory
Code	3
ECTS	3
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members
Prequisites	None
Semestre	Fall
Course Content	Basic information about the main areas, historical development and contributing scientists of Electrical and Electronics Engineering (EEE). Discussion of the social and ethical aspects of the engineering profession. Tools and methods used in the field. Interaction between EEE and other engineering disciplines and science. Basic elements of electrical engineering: Devices, circuits, and systems. Interactions of these elements and engineering methods. Introduction to faculty members and research areas. Knowledge transfer from experienced engineers.
Learning Outcomes	After taking this course students will be able to; Know history of engineering and Electrical And Electronics Engineering. Know basic principles and various areas of Electrical And Electronics Engineering. Know engineering ethic concepts
References	1- *Introduction to Electrical and Computer* Engineering, Charles B Fleddermann; Martin D Bradshaw, Upper Saddle River: Prentice Hall, 2003. 2-
Learning and teaching strategies	Lecturing, discussion, report preparation and submission.
Evaluation	Take Home Exams 20%, mid-term 30%, and final exam 50%
Course Language	English

Form IIIb (English): COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Negotiation Process	EEE102	Fall	2	0	0	2	3
Prequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery (face to face,distance learning)	Face to face						
Learning and teaching strategies	Lecturing, discussion, self-study, take home exams.						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	To make students understand the negotiation process and prepare them to handle this process To introduce freshman into the scope and material covered in EEE To engender enthusiasm for the discipline by seeing real world applications To invite students to find a professional home in ECE To develop qualitative intuition in prep for quantitative analysis of EEE						
Learning outcomes	After taking this course students will be able to; Know history of engineering and Electrical And Electronics Engineering. Know basic principles and various areas of Electrical And Electronics Engineering. Know engineering ethic concepts						
Course Content	Basic information about the main areas, historical development and contributing scientists of Electrical and Electronics Engineering (EEE). Discussion of the social and ethical aspects of the engineering profession. Tools and methods used in the field. Interaction between EEE and other engineering disciplines and science. Basic elements of electrical engineering: Devices, circuits, and systems. Interactions of these elements and engineering methods. Introduction to faculty members and research areas. Knowledge transfer from experienced engineers.						
Mode of Delivery	In class / Distance / Hybrid						
References	1- *Introduction to Electrical and Computer* Engineering, Charles B Fleddermann; Martin D Bradshaw, Upper Saddle River: Prentice Hall, 2003. 2-						

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Basic information about Engineering, Basic information about the main areas, historical development and contributing scientists of Electrical and Electronics Engineering
2. Week	Engineering and Ethics
3. Week	Engineering and Ethics
4. Week	Interaction between EEE and other engineering disciplines and science.
5. Week	About the Department and Laboratories
6. Week	Basic elements of electrical engineering: Devices, circuits, and systems.
7. Week	Mid- term exam
8. Week	Interactions of these elements and engineering methods.
9. Week	Tools and methods used in the field.
10. Week	Introduction to faculty members and research areas.
11. Week	Knowledge transfer from experienced engineers.
12. Week	Knowledge transfer from experienced engineers.
13. Week	Technical visit to an engineering company
14. Week	Technical visit to an engineering company
15. Week	Repeat
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Quiz	0	%0
Fieldwork	0	%0
Practice	0	%0
Take Home Exam	2	%15
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%35
Final Exam	1	%50
Total	18	%100
Contribution of semester Works to success points	17	%50
Contribution of final exam to success points	1	%50
Total	18	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	2	28
Laboratory			
Quiz			
Specific practical training			
Take Home Exam	2	6	12
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	12	12
Final Exam (Study duration)	1	20	20
Total Workload	18	40	72

Form VIIb (English): en

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.		X			
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.		X			
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.	X				
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.		X			
5 Ability to design and conduct experiments, gather data, analyze and		X			

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually		X			
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions				X	
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in		X			

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE NAME

Course Name	EEE 102 – Introduction to EEE
Course Type	Compulsory
Code	3
ECTS	3
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members
Prequisites	None
Semestre	Fall
Course Content	Basic information about the main areas, historical development and contributing scientists of Electrical and Electronics Engineering (EEE). Discussion of the social and ethical aspects of the engineering profession. Tools and methods used in the field. Interaction between EEE and other engineering disciplines and science. Basic elements of electrical engineering: Devices, circuits, and systems. Interactions of these elements and engineering methods. Introduction to faculty members and research areas. Knowledge transfer from experienced engineers.
Learning Outcomes	After taking this course students will be able to; Know history of engineering and Electrical And Electronics Engineering. Know basic principles and various areas of Electrical And Electronics Engineering. Know engineering ethic concepts
References	1- *Introduction to Electrical and Computer* Engineering, Charles B Fleddermann; Martin D Bradshaw, Upper Saddle River: Prentice Hall, 2003. 2-
Learning and teaching strategies	Lecturing, discussion, report preparation and submission.
Evaluation	Take Home Exams 20%, mid-term 30%, and final exam 50%
Course Language	English

Form IIIb (English): COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Negotiation Process	EEE102	Fall	2	0	0	2	3
Prequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery (face to face,distance learning)	Face to face						
Learning and teaching strategies	Lecturing, discussion, self-study, take home exams.						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	To make students understand the negotiation process and prepare them to handle this process To introduce freshman into the scope and material covered in EEE To engender enthusiasm for the discipline by seeing real world applications To invite students to find a professional home in ECE To develop qualitative intuition in prep for quantitative analysis of EEE						
Learning outcomes	After taking this course students will be able to; Know history of engineering and Electrical And Electronics Engineering. Know basic principles and various areas of Electrical And Electronics Engineering. Know engineering ethic concepts						
Course Content	Basic information about the main areas, historical development and contributing scientists of Electrical and Electronics Engineering (EEE). Discussion of the social and ethical aspects of the engineering profession. Tools and methods used in the field. Interaction between EEE and other engineering disciplines and science. Basic elements of electrical engineering: Devices, circuits, and systems. Interactions of these elements and engineering methods. Introduction to faculty members and research areas. Knowledge transfer from experienced engineers.						
Mode of Delivery	In class / Distance / Hybrid						
References	1- *Introduction to Electrical and Computer* Engineering, Charles B Fleddermann; Martin D Bradshaw, Upper Saddle River: Prentice Hall, 2003. 2-						

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Basic information about Engineering, Basic information about the main areas, historical development and contributing scientists of Electrical and Electronics Engineering
2. Week	Engineering and Ethics
3. Week	Engineering and Ethics
4. Week	Interaction between EEE and other engineering disciplines and science.
5. Week	About the Department and Laboratories
6. Week	Basic elements of electrical engineering: Devices, circuits, and systems.
7. Week	Mid- term exam
8. Week	Interactions of these elements and engineering methods.
9. Week	Tools and methods used in the field.
10. Week	Introduction to faculty members and research areas.
11. Week	Knowledge transfer from experienced engineers.
12. Week	Knowledge transfer from experienced engineers.
13. Week	Technical visit to an engineering company
14. Week	Technical visit to an engineering company
15. Week	Repeat
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Quiz	0	%0
Fieldwork	0	%0
Practice	0	%0
Take Home Exam	2	%15
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%35
Final Exam	1	%50
Total	18	%100
Contribution of semester Works to success points	17	%50
Contribution of final exam to success points	1	%50
Total	18	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	2	28
Laboratory			
Quiz			
Specific practical training			
Take Home Exam	2	6	12
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	12	12
Final Exam (Study duration)	1	20	20
Total Workload	18	40	72

Form VIIb (English): en

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.		X			
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.		X			
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.	X				
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.		X			
5 Ability to design and conduct experiments, gather data, analyze and		X			

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually		X			
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions				X	
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in		X			

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

Form IIIb (English): COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 103- Molecular Biology and Biochemistry	Fall	3	0	0	3	5

Prequisites	None
Course Language	English
Course Type	Compulsory
Mode of Delivery (face to face,distance learning)	Distance learning
Learning and teaching strategies	Weekly theoretical online course hours Internet browsing, library work Quizzez and preparation for quizzes Preparation of Midterm and Midterm Exam Final Exam and Preparation for Final Exam
Instructor (s)	Asst.Prof.Dr. Ayşe ÖZDEMİR
Course objective	Introducing the Molecular biology and genetics to understand basic applications of biology in engineering.
Learning outcomes	Students who succeed this course: 1. know basic concepts of molecular biology and genetics and their applications in engineering 2. learn the fundamentals of biological processes 3. have knowledge about bioinformatic tools
Course Content	Introduction to Human Genome Project and its medical results, gene sequencing and relationship to hereditary genetic diseases. Introduction of molecular and cellular biology, cells, inheritance and gene expression. Biological molecules and structure and organization of cells, DNA replication, transcription and translation, regulation of gene expression. Introduction to computer algorithms used in bioinformatics resarch and applications.
Mode of Delivery	Distance
References	*1- BRS Biochemistry, Molecular Biology & Genetics, 8.th ed., M.A. Lieberman, R. Ricer* *2- Lodish, U. H. (2016). Molecular Cell Biology. W.H. Freeman.*

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction of molecular biology, cells and organization
2. Week	Biological molecules and structures
3. Week	History of genetics, knowledge about basic terminology
4. Week	What is inheritance? What is chromosome?
5. Week	What are mitosis and meiosis?
6. Week	DNA replication process and repair mechanisms
7. Week	Gene expression - transcription and translation
8. Week	Regulation of gene expression and control mechanism
9. Week	Gene sequencing and relationship to hereditary genetic diseases
10. Week	Genetics of cancer
11. Week	Introduction to Human Genome Project (HGP) and its medical results
12. Week	Introduction to computer algorithms used in bioinformatics research and properties of these algorithms
13. Week	Bioinformatics research and applications
14. Week	Molecular biology, biochemistry research and applications
15. Week	Repeat
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	0%
Laboratory	0	0%
Quiz	4	30%
Fieldwork	0	0%
Practice	0	0%
Take Home Exam	0	0%
Presentation	0	0%
Homeworks	10	0%
Project	0	0%
Seminar	0	0%
Mid-term Exams	1	30%
Final Exam	1	40%
Total	30	100%
Contribution of semester Works to success points	29	60%
Contribution of final exam to success points	1	40%
Total	30	100%

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	3	42
Laboratory			
Quiz	4	4	16
Specific practical training			
Take Home Exam			
Study Hours Out of Class (Preliminary work, reinforcement, ect)	3	4	12
Presentation / Seminar Preparation			
Project			
Homework assignment	10	3	30
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	30	30
Total Workload	33	64	150

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.				x	
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.			x		
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.		x			
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.			x		
5 Ability to design and conduct experiments, gather data, analyze and			X		

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually			x		
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions			x		
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself				x	
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in	x				

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .			x		

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE SYLLABUS

COURSE NAME

Course Name	EEE 201 – Circuit Theory I
Course Type	Compulsory
Code	3
ECTS	7
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members
Prequisites	None
Semestre	Fall
Course Content	Review of current, voltage and resistance. Ohm's law, power and energy. Series-parallel DC circuits. Controlled sources. Methods of DC circuit analysis; mesh and nodal analysis. Multi-terminal components and terminal equations. DC network theorems. Capacitors, operational amplifiers. Magnetic circuits and inductors. First Order Circuits. First order linear differential equations with constant coefficients, Second Order Circuits.
Learning Outcomes	After taking this course students will be able to; -Use basic DC circuit analysis methods (node voltages, loop and mesh currents). -Know and use necessary techniques in circuit analysis (circuit simplification, star-delta equivalent, Thevenin, Norton, superposition, source conversion) -Know and apply the maximum power transfer theorem. -Analyze first and second order circuits. -Analyze operational amplifier circuits. -Choose and apply appropriate methods for analysis of complex circuits. -Design basic electrical circuits.
References	1- *Fundamentals of Electric Circuits, C. K. Alexander and M. N. O. Sadiku, 7th Ed., McGraw-Hill Book Company.* 2- *Electric Circuits, J. W. Nilsson and S. A. Riedel, 10th Ed., Pearson Prentice Hall.* 3- *Basic Engineering Circuit Analysis, J. David Irwin, Robert M. Nelms, 10th edition., Wiley*

Learning and teaching strategies	Lecturing, discussion, report preparation and submission.
Evaluation	Laboratory activities 16%, Quizzes 16%, Take Home Exams 8%, mid-term 25%, and final exam 35%
Course Language	English

Form IIIb (English): COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Negotiation Process	EEE201	Fall	4	0	2	4	7
Prequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery (face to face,distance learning)	Face to face						
Learning and teaching strategies	Lecturing, discussion, self-study, take home exams. Laboratory activities						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	To make students understand the negotiation process and prepare them to handle this process To teach students, 1) Basic lumped circuit concepts, 2) Basic properties and analysis methods of linear electrical circuits, 3) Basic properties and analysis methods of first order and second order circuits.						
Learning outcomes	After taking this course students will be able to; -Use basic DC circuit analysis methods (node voltages, loop and mesh currents). -Know and use necessary techniques in circuit analysis (circuit simplification, star-delta equivalent, Thevenin, Norton, superposition, source conversion) -Know and apply the maximum power transfer theorem.						

	-Analyze first and second order circuits. -Analyze operational amplifier circuits. -Choose and apply appropriate methods for analysis of complex circuits. -Design basic electrical circuits. -
Course Content	Review of current, voltage and resistance. Ohm's law, power and energy. Series-parallel DC circuits. Controlled sources. Methods of DC circuit analysis; mesh and nodal analysis. Multi-terminal components and terminal equations. DC network theorems. Two-port parameters. Capacitors, operational amplifiers. Magnetic circuits and inductors. First Order Circuits. First order linear differential equations with constant coefficients, Second Order Circuits.
Mode of Delivery	In class / Distance / Hybrid
References	1- *Fundamentals of Electric Circuits, C. K. Alexander and M. N. O. Sadiku, 7th Ed., McGraw-Hill Book Company.* 2- *Electric Circuits, J. W. Nilsson and S. A. Riedel, 10th Ed., Pearson Prentice Hall.* 3- *Basic Engineering Circuit Analysis, J. David Irwin, Robert M. Nelms, 10th edition., Wiley*

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction, Review of current, voltage and resistance. Ohm's law, power and energy
2. Week	Series-parallel DC circuits. Controlled sources.
3. Week	Methods of DC circuit analysis; mesh and nodal analysis.
4. Week	Linearity, Superposition, and Source Transformation
5. Week	Thevenin's Theorem and Norton's Theorem

6. Week	Maximum Power Transfer
7. Week	Mid- term exam
8. Week	Operational amplifiers.
9. Week	Capacitors
10. Week	Magnetic circuits and inductors
11. Week	First Order Circuits, Source-free RL and RC Circuits
12. Week	Step Response RL and RC Circuits
13. Week	Second Order Circuits.
14. Week	Second Order Circuits.
15. Week	Repeat
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	14	%16
Quiz	4	%16
Fieldwork	0	%0
Practice	0	%0
Take Home Exam	2	%8
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%25
Final Exam	1	%35
Total	36	%100
Contribution of semester Works to success points	35	%65
Contribution of final exam to success points	1	%35
Total	36	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	4	56
Laboratory	14	3	42
Quiz	4	4	16
Specific practical training			
Take Home Exam	2	6	12
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	25	30
Total Workload	36	77	176

Form VIIb (English): en

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.					X
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.					X
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.		X			
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.		X			
5 Ability to design and conduct experiments, gather data, analyze and			X		

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually		X			
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions				X	
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in		X			

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
MATH 201- Engineering Mathematics I	Spring	4	0	0	4	6
Prerequisites	None					
Course Language	English					
Course Type	Compulsory					
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Department Instructor(s)					
Course objective	To provide the basic concepts of matrix algebra. To teach to solve systems of linear equations and compute inverse of a square matrix. Compute the determinant of a matrix. To give knowledge the basic concept of vector spaces, basis, dimension, and linear transformations and compute the matrix representations of some linear transformations					
Course Content	Vectors and systems of linear equations; vector spaces; linear transformations; orthogonality; algebra of complex numbers; eigenvalue problems, Systems of linear equations, and matrices, abstract concepts such as a vector space, a linear transformation acting on the vector spaces, Eigenvalues and their corresponding eigenvectors. The basic concept of inner product spaces. Differential equations and solutions Linear algebra Systems differential equations and solutions Series solutions of differential equations					
References	1. B. Kolman and D.R. Hill. Elemantery Linear Algebra with Applications. Pearson I.E. (9th Edition) 2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, Wiley, 2006. 3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary-Value Problems, 9th Edition, Wiley, 2000. 3. F. B. Hildebrand, Advanced Calculus for Applications, 2nd Edition, Prentice-Hall, 1976. 4. S. L. Ross, Differential Equations, 3rd Edition, Wiley, 1984.					
Learning outcomes	LO-1: Learn the basic concepts of matrix algebra. LO-2: Calculate and solve systems of linear equations LO-3: Calcuate vector calculus and appy to the related problems. LO-4: Learn matrix concept LO-5: Learn differantiom equation solutions LO-6: Understand diffarenatial equations					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Systems of Equations
2. Week	Solution Sets and Linear Transformations
3. Week	Eigenvectors, Eigenvalues
4. Week	Null and Column Spaces
5. Week	Rank, matrix properties
6. Week	Orthogonal Projections
7. Week	Midterm
8. Week	Linear independence,Wronskian, Theory of homogeneous differential equation
9. Week	Theory of nonhomogeneous differential equations;
10. Week	Undetermined coeffcients and Variation of parameters
11. Week	Higher-order linear differential equations; Generalization of the theory introduced above
12. Week	Systems of differential equations
13. Week	Series solutions of differential equations
14. Week	Differmtial equations system solutions
15. Week	Course review
16. Week	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	4	56
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	6	84
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			172
Total Workload/30 hours			5.73
ECTS			6.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE SYLLABUS

COURSE NAME

Course Name	EEE 202 – Circuit Theory II
Course Type	Compulsory
Code	3
ECTS	7
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members
Prequisites	None
Semestre	Spring
Course Content	AC circuits. Sinusoids and Phasors. Sinusoidal steady state analysis. Application of basic circuit analysis techniques to Phasors. AC Power analysis. Three Phase Circuits. Magnetically Coupled Circuits. Frequency Response and Filters. Application of Laplace transformation to circuit analysis. Fourier series and transformation. Two-port networks.
Learning Outcomes	After taking this course students will be able to; - Can perform sinusoidal steady state analysis by using phasor concept -Can calculate power in single-phase and three-phase AC circuits. - Can calculate RMS and average values of periodical signals. - Can calculate circuit responses by using Laplace transformation - Can calculate frequency of circuits, can show the frequency variations by Bode graphs. - Can analyze and design passive low-pass, high-pass, band-pass, band-stop filter circuits - Can calculate the parameters of two-port networks - Can perform simple AC circuit designs.
References	1- *Fundamentals of Electric Circuits, C. K. Alexander and M. N. O. Sadiku, 7th Ed., McGraw-Hill Book Company.* 2- *Electric Circuits, J. W. Nilsson and S. A. Riedel, 10th Ed., Pearson Prentice Hall.* 3- *Basic Engineering Circuit Analysis, J. David Irwin, Robert M. Nelms, 10th edition., Wiley*
Learning and teaching strategies	Lecturing, discussion, lab. experiments, report preparation and submission.
Evaluation	Laboratory activities 16%, Quizzes 16%, Take Home Exams 8%, mid-term 25%, and final exam 35%
Course Language	English

Form IIIb (English): COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Negotiation Process	EEE201	Fall	4	0	2	4	7
Prequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery (face to face,distance learning)	Face to face						
Learning and teaching strategies	Lecturing, discussion, self-study, take home exams. Laboratory activities						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	To make students understand the negotiation process and prepare them to handle this process To teach students, To learn the methods, techniques and transformations necessary for AC circuit analysis, and how to design simple circuits by using these concepts 1) Basic AC circuit concepts using phasor and Laplace Transform methods, 2) Basic properties and analysis methods of AC linear electrical circuits, 3) Basic properties and analysis methods of three phase circuits. 4) Two port networks						
Learning outcomes	After taking this course students will be able to; - Can perform sinusoidal steady state analysis by using phasor concept -Can calculate power in single-phase and three-phase AC circuits. - Can calculate RMS and average values of periodical signals. - Can calculate circuit responses by using Laplace transformation - Can calculate frequency of circuits, can show the frequency variations by Bode graphs. - Can analyze and design passive low-pass, high-pass, band-pass, band-stop filter circuits - Can calculate the parameters of two-port networks - Can design simple AC circuits.						
Course Content	AC circuits. Sinusoids and Phasors. Sinusoidal steady state analysis. Application of basic circuit analysis techniques to Phasors. AC Power analysis. Three Phase Circuits. Magnetically Coupled Circuits. Frequency Response and Filters. Application of Laplace						

	transformation to circuit analysis. Fourier series and transformation. Two-port networks.
Mode of Delivery	In class / Distance / Hybrid
References	1- *Fundamentals of Electric Circuits, C. K. Alexander and M. N. O. Sadiku, 7th Ed., McGraw-Hill Book Company.* 2- *Electric Circuits, J. W. Nilsson and S. A. Riedel, 10th Ed., Pearson Prentice Hall.* 3- *Basic Engineering Circuit Analysis, J. David Irwin, Robert M. Nelms, 10th edition., Wiley*

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Phasors. Review of current, voltage and resistance, Ohm's law, power and energy concepts in AC circuits
2. Week	Sinusoidal steady state analysis. Application of basic circuit analysis techniques to Phasors.
3. Week	AC Power analysis. Maximum Average Power Transfer
4. Week	Three Phase Circuits.
5. Week	Magnetically Coupled Circuits: Mutual Inductance,Energy in a Coupled Circuit
6. Week	Magnetically Coupled Circuits: Linear Transformers,Ideal Transformers,Ideal Autotransformers
7. Week	Mid- term exam
8. Week	Frequency Response and Filters: Transfer Function,The Decibel Scale,Bode Plots, Series Resonance,Parallel Resonance,
9. Week	Frequency Response and Filters: Passive Filters,Active Filters
10. Week	Application of Laplace transformation to circuit analysis.

11. Week	Fourier series and transformation: Circuit applications
12. Week	Fourier series and transformation: Circuit applications
13. Week	Two-port networks: Impedance Parameters,Admittance Parameters,Hybrid Parameters,Transmission Parameters Relationships Between Parameters, Interconnection of Networks
14. Week	Two-port networks: Relationships Between Parameters, Interconnection of Networks
15. Week	Repeat
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	14	%16
Quiz	4	%16
Fieldwork	0	%0
Practice	0	%0
Take Home Exam	2	%8
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%25
Final Exam	1	%35
Total	36	%100
Contribution of semester Works to success points	35	%65
Contribution of final exam to success points	1	%35
Total	36	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	4	56
Laboratory	14	3	42
Quiz	4	4	16
Specific practical training			
Take Home Exam	2	6	12
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	25	30
Total Workload	36	77	176

Form VIIb (English): en

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.					X
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.					X
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.		X			
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.		X			
5 Ability to design and conduct experiments, gather data, analyze and			X		

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually		X			
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions				X	
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in		X			

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
MATH 203- Advanced Mathematics	Fall	4	0	0	4	6
Prerequisites	None					
Course Language	English					
Course Type	Compulsory					
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Department Instructor(s)					
Course objective	The aim of this course is to explain some basic concepts of Mathematics and show how to use these concepts in solving certain types of problems which might possibly be encountered in many branches of science and engineering. Providing detailed knowledge on probability and random processes to students. Teaching the relation between single/multiple random variable and random processes. Engineering applications of probability theory and random processes.					
Course Content	• Discrete mathametics subjects • Complex mathematic subjects • Pigeonhole Principle, Basic Proof Techniques • Equivalences and Normal Forms • Quantificational Logic, Countability • Graphs and Relations • Growth Rates of Functions • Convergent and Divergent Series • Public Key Cryptography					
References	1. Discrete Mathematics and its Applications (6th Edition) by Kenneth H. Rosen (McGraw-Hill, Inc., New York, 2007) 2. Complex Analysis by J. Bak and D. J. Newman; Springer 3. F. B. Hildebrand, Advanced Calculus for Applications, 2nd Edition, Prentice-Hall, 1976.					
Learning outcomes	LO-1: Construct modelling analysis LO-2: Execute modelling computation and applications LO-3: Ability to make complex anaytical analysis LO-4: Learn complex functions LO-5: Execute applications for systems using function analyses.					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Logic and Proofs
2. Week	Basic Structures,
3. Week	Induction and Recursion
4. Week	Relations, Graphs
5. Week	Modeling Computation, Finite-State Machines
6. Week	Advanced Counting Techniques
7. Week	Midterm
8. Week	Complex Analysis
9. Week	Complex Analytic Functions
10. Week	Complex Integral, Complex Series
11. Week	Complex Analysis Applied to Potential Theory
12. Week	Evaluation of some real integrals using residue theorem
13. Week	Geometry of the complex plane,
14. Week	Harmonic functions and analytic functions
15. Week	Course review
16. Week	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	4	56
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	6	84
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			172
Total Workload/30 hours			5.73
ECTS			6.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE SYLLABUS

COURSE NAME

Course Name	EEE 203 – Digital Design
Course Type	Compulsory
Code	3
ECTS	5
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members
Prequisites	None
Semestre	Fall
Course Content	Digital Systems and Binary Numbers. Axiomatic definition of Boolean Algebra. Boolean functions. Minimization. Digital Logic Gates. Hardware Description Languages (HDL).Analysis and Design of Combinational Circuits. Combinational Circuit design examples with HDL. Boolean Function Implementation with MSI and LSI. HDL Model of Boolean Functions by MSI elements. Storage Elements: latches, Flip-Flops, HDL Model of SR and D Latches, Analysis and Design of Synchronous Sequential Circuits, HDL Model of Finite State Machine.
Learning Outcomes	After taking this course students will be able to; - Understand of difference between Digital and Analog Systems, understand number systems - Understand Boolean Algebra and Boolean Functions - Minimize of Boolean Functions - Design Combinational Circuits by Using Gates in Two Levels -Implement of Boolean Functions with MSI elements and PLDs -Analyze and Design Synchronous Sequential Circuits -Model Combinational and Synchronous Sequential Circuits by Using HDLs
References	1- *M. Morris Mano, Michael D. Ciletti "Digital Design: With an Introduction to the Verilog HDL ", Prentice Hall International, 5th Edition, 2012* 2- *Ciletti M.D., Advanced Digital Design with the Verilog HDL, 2/e, Pearson, 2011.* 3-
Learning and teaching strategies	Lecturing, discussion, report preparation and submission.
Evaluation	Laboratory activities 15%, Quizzes 14%, Take Home Exams 6%, mid-term 25%, and final exam 40%

Course Language	English

Form IIIb (English): COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Negotiation Process	EEE203	Fall	3	0	2	4	5
Prequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery (face to face,distance learning)	Face to face						
Learning and teaching strategies	Lecturing, discussion, self-study, take home exams. Laboratory activities						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	To make students understand the negotiation process and prepare them to handle this process To teach students, Analysis and Design of Combinational Circuits Analysis and Design of Synchronous Sequential Logic Ability to use Hardware Description Languages						
Learning outcomes	After taking this course students will be able to; - Understand of difference between Digital and Analog Systems, understand number systems - Understand Boolean Algebra and Boolean Functions - Minimize of Boolean Functions - Design Combinational Circuits by Using Gates in Two Levels -Implement of Boolean Functions with MSI elements and PLDs -Analyze and Design Synchronous Sequential Circuits - Model Combinational and Synchronous Sequential Circuits by Using HDLs						
Course Content	Digital Systems and Binary Numbers. Axiomatic definition of Boolean Algebra. Boolean functions. Minimization. Digital Logic Gates. Hardware Description Languages (HDL).Analysis and Design of Combinational Circuits. Combinational Circuit design examples with HDL. Boolean Function Implementation with MSI and LSI. HDL Model of Boolean Functions by MSI elements. Storage Elements: latches, Flip-Flops,						

	HDL Model of SR and D Latches, Analysis and Design of Synchronous Sequential Circuits, HDL Model of Finite State Machine.
Mode of Delivery	In class / Distance / Hybrid
References	1- *M. Morris Mano, Michael D. Ciletti "Digital Design: With an Introduction to the Verilog HDL ", Prentice Hall International, 5th Edition, 2012* 2- *Ciletti M.D., Advanced Digital Design with the Verilog HDL, 2/e, Pearson, 2011.* 3-

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Digital Systems, Analog/Digital conversion, Number Systems, Number-Base Conversions, Binary Numbers
2. Week	Basic Theorems and Properties of Boolean Algebra
3. Week	Boolean Functions: Canonical Forms. Digital Logic Gates
4. Week	Hardware Description Languages, HDL Behavior Models of Boolean Functions
5. Week	Minimization: Quinn McCluskey Method
6. Week	Karnaugh Diagrams, Don't-Care Conditions, Universal Gates, NAND and NOR Implementation
7. Week	Analysis and Design of Combinational Circuits.
8. Week	Combinational Circuit design examples with HDL.
9. Week	MSI Elements (Decoders, Encoders, Multiplexers, Demultiplexers) and realization of Boolean Function using MSI elements
10. Week	HDL Parametric Model of Decoders, Encoders, Multiplexers, Demultiplexers. HDL Model of Boolean Functions with MSI elements as Sub-Modules

11. Week	Programmable Logic Devices (PLDs). PAL Architecture (ROM, PAL, PLA). Realizaton of Boolean functions using PLDs.
12. Week	Storage Elements: latches, Flip-Flops, HDL Model of SR Latch, SR latch with control input, D Latch, D Flip-flop
13. Week	Analysis of Synchronous Sequential Circuits, Meally and Moore Finite State Machines
14. Week	Synchronous counters.
15. Week	Repeat
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	14	%15
Quiz	4	%14
Fieldwork	0	%0
Practice	0	%0
Take Home Exam	2	%6
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%25
Final Exam	1	%40
Total	36	%100
Contribution of semester Works to success points	35	%60
Contribution of final exam to success points	1	%40
Total	36	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	3	42
Laboratory	14	2	28
Quiz	4	3	12
Specific practical training			
Take Home Exam	2	5	10
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	15	15
Final Exam (Study duration)	1	20	20
Total Workload	36	48	127

Form VIIb (English): en

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.					X
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.					X
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.		X			
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.		X			
5 Ability to design and conduct experiments, gather data, analyze and			X		

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually		X			
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions				X	
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in		X			

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 204 - Electronics I	Spring	3	0	2	4	5
Prerequisites	None					
Course Language	English					
Course Type	Compulsory					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)						
Course objective	To know the operation and the structure of the electronics devices like diodes, bipolar transistor and field effect transistors. Design and analysis of different types of amplifiers.					
Course Content	Diode circuits, Zener diodes, rectifiers, filters. BJT, MOSFET and JFET amplifier design including biasing, small signal analysis and frequency response. Design of multistage amplifiers. Differential and operational amplifier design. Output stages.					
References	1. "Microelectronics Circuit Analysis and Design"*, Donald Neamen, 4th Ed., McGraw-Hill Education.* 2. Adel S. SEDRA and Kenneth C. SMITH, Microelectronic Circuits, 5th Edition, Oxford: Int. Edition. 3. Jaeger, R.C., Microelectronic Circuit Design (1st Ed.), McGraw-Hill, 1997, ISBN: 0-07-032482-4. 4. *"Fundamentals of Microelectronics", B. Rezavi,2 th edition. Wiley*					
Learning outcomes	After taking this course students will be able to; 1. Analyze and design diode circuits and rectifiers. 2. Analyze and design small-signal BJT amplifiers stages. 3. Analyze and design small-signal MOSFET amplifiers stages.					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	Introduction
2	Introduction
3	Diodes

4	Diodes
5	Diodes
6	Bipolar Junction Transistors (BJTs)
7	Midterm
8	Bipolar Junction Transistors (BJTs)
9	Field-Effect Transistors
10	Field-Effect Transistors
11	Differential and Multistage amplifiers
12	Differential and Multistage amplifiers
13	Frequency Response of amplifiers
14	Frequency Response of amplifiers
15	Recitation
16	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	
Laboratory	14	%22
Quiz	4	%20
Fieldwork	0	
Practice	0	
Homework Assessment	2	%8
Presentation	0	
Project	0	
Seminar	0	
Mid-term Exams	1	%20
Final Exam	1	%30
Total	32	%100
Contribution of semester Works to success points	31	%70
Contribution of final exam to success points	1	%30
Total	32	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory	14	2	28
Quiz	4	5	20
Specific practical training			
Field activities			

Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	22	22
Final Exam (Study duration)	1	26	26
Total Workload			152
Total Workload/30 hours			152/30
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
1					X
2					X
3			X		
4				X	
5			X		
6		X			
7				X	
8			X		
9			X		
10		X			
11		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

ANKARA SCIENCE UNIVERSITY
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DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
MATH 204- Engineering Mathematics II	Spring	4	0	0	4	6
Prerequisites	None					
Course Language	English					
Course Type	Compulsory					
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Department Instructor(s)					
Course objective	The aim of this course is to explain some basic concepts of Mathematics and show how to use these concepts in solving certain types of problems which might possibly be encountered in many branches of science and engineering. Providing detailed knowledge on probability and random processes to students. Teaching the relation between single/multiple random variable and random processes. Engineering applications of probability theory and random processes.					
Course Content	Probabiity and randam variables Laplace Transforms Vector Differential Calculus and Vector Integral Calculus Fourier Series and Transforms Advance Partial Differential Equations					
References	2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, Wiley, 2006. 3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary-Value Problems, 9th Edition, Wiley, 2000. 3. F. B. Hildebrand, Advanced Calculus for Applications, 2nd Edition, Prentice-Hall, 1976. 4. S. L. Ross, Differential Equations, 3rd Edition, Wiley, 1984.					
Learning outcomes	LO-1: Construct sample space of a probabilistic experiment and interpret the axioms of probability LO-2: Compute expected value, variance, random variablaes LO-3: Determine probability mass function (PMF). LO-4: Learn Fourier Series and Transforms LO-5: learn Laplace Transforms					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Probability Space, Conditional Probability,
2. Week	Bayes' Rule, Independence, Counting
3. Week	Conditioning and Independence, Covariance and correlation
4. Week	Poisson Processes, Continuous Time Markov Chains
5. Week	Detection, Bayes' Rule, Neyman-Pearson Theorem
6. Week	Cramer-Rao bound, Hidden Markov Chains, Viterbi Algorithm
7. Week	Midterm
8. Week	Vector Differential Calculus, Vector Integral Calculus
9. Week	Evaluation of some real integrals using residue theorem
10. Week	Undetermined coeffcients and Variation of parameters
11. Week	Fourier Series and Transforms
12. Week	Fourier Series and Transforms
13. Week	Laplace Transforms
14. Week	Laplace transform of initial-value problems, Convolution theorem
15. Week	Course review
16. Week	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	4	56
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	6	84
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			172
Total Workload/30 hours			5.73
ECTS			6.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE NAME

Course Name	EEE 205 – Computer Tools for Electrical Engineering
Course Type	Compulsory
Code	3
ECTS	3
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members
Prequisites	None
Semestre	Fall
Course Content	Matlab expressions, constants, variables, arrays. Graph plots. Procedures and functions. Matlab syntax. Graphic User Interface (GUI). Linear algebra using Matlab. PSpice overview, Circuit schematics, schematic rules and analysis types. Modeling with PSpice, mixed analog and digital simulation, measurement in PSpice. Programming in Labview.
Learning Outcomes	After taking this course students will be able to; - learn basic Matlab programming - learn Graphic User Interface (GUI) design - learn PSpice software -learn Labview programming
References	1- *COMPUTER TOOLS FOR. ELECTRICAL ENGINEERS. MATLAB & SPICE. James C. Squire, P.E. and Julie Phillips Brown,* 2-
Learning and teaching strategies	Lecturing, discussion, report preparation and submission.
Evaluation	Laboratory activities 15%, Take Home Exams 6%, mid-term 25%, and final exam 40%
Course Language	English

Form IIIb (English): COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS

Negotiation Process	EEE205	Fall	2	0	1	2	3
Prequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery (face to face,distance learning)	Face to face						
Learning and teaching strategies	Lecturing, discussion, self-study, take home exams. Laboratory activities						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	To make students understand the negotiation process and prepare them to handle this process To teach students, basic Matlab programming Graphic User Interface (GUI) design Design with PSpice Programming with labview						
Learning outcomes	After taking this course students will be able to; - learn basic Matlab programming - learn Graphic User Interface (GUI) design - learn PSpice software -learn Labview programming						
Course Content	Matlab expressions, constants, variables, arrays. Graph plots. Procedures and functions. Matlab syntax. Graphic User Interface (GUI). Linear algebra using Matlab. PSpice overview, Circuit schematics, schematic rules and analysis types. Modeling with PSpice, mixed analog and digital simulation, measurement in PSpice. Programming in Labview.						
Mode of Delivery	In class / Distance / Hybrid						
References	1- *COMPUTER TOOLS FOR. ELECTRICAL ENGINEERS. MATLAB & SPICE. James C. Squire, P.E. and Julie Phillips Brown,* 2-						

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Digital Systems, Analog/Digital conversion, Number Systems, Number-Base Conversions, Binary Numbers
2. Week	Basic Theorems and Properties of Boolean Algebra
3. Week	Boolean Functions: Canonical Forms. Digital Logic Gates
4. Week	Hardware Description Languages, HDL Behavior Models of Boolean Functions
5. Week	Minimization: Quinn McCluskey Method
6. Week	Karnaugh Diagrams, Don't-Care Conditions, Universal Gates, NAND and NOR Implementation
7. Week	Analysis and Design of Combinational Circuits.
8. Week	Combinational Circuit design examples with HDL.
9. Week	MSI Elements (Decoders, Encoders, Multiplexers, Demultiplexers) and realization of Boolean Function using MSI elements
10. Week	HDL Parametric Model of Decoders, Encoders, Multiplexers, Demultiplexers. HDL Model of Boolean Functions with MSI elements as Sub-Modules
11. Week	Programmable Logic Devices (PLDs). PAL Architecture (ROM, PAL, PLA). Realizaton of Boolean functions using PLDs.
12. Week	Storage Elements: latches, Flip-Flops, HDL Model of SR Latch, SR latch with control input, D Latch, D Flip-flop
13. Week	Analysis of Synchronous Sequential Circuits, Meally and Moore Finite State Machines
14. Week	Synchronous counters.
15. Week	Repeat
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Quiz	0	%0
Fieldwork	0	%0
Practice	0	%0
Take Home Exam	4	%20
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%50
Total	36	%100
Contribution of semester Works to success points	35	%60
Contribution of final exam to success points	1	%40
Total	36	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	2	28
Laboratory			
Quiz			
Specific practical training			
Take Home Exam	4	4	16
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	10	10
Final Exam (Study duration)	1	20	20
Total Workload	20	36	74

Form VIIb (English): en

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.					X
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.					X
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.		X			
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.				X	
5 Ability to design and conduct experiments, gather data, analyze and			X		

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually		X			
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions				X	
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice				X	
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in		X			

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 206-Electromagnetic Field Theory	Spring	4	0	0	4	6
Prerequisites	None					
Course Language	English					
Course Type	Compulsory					
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Ercument KARAPINAR, PhD					
Course objective	To provide the basic principles of electromagnetics emphasizing on the characterization and the solution of static and dynamic electric and magnetic field problems					
Course Content	Steady electric currents. Static magnetic fields: BiotSavart law, Ampere's law, vector magnetic potential, inductance, magnetostatic force and energy. Faraday's law of induction. Wave concept. Maxwell's equations.Plane waves. Polarization. Poynting's vector.					
References	1. D.K.Cheng, Filed and Wave Electromagnetics, 2nd ed., David k.Cheng, AdissonWesley, 1989. 2. F.T.Ulaby, AppliedElectromagnetics, ,PrenticeHall, 2010. 3. Hayt, and J.A. Buck, "EngineeringElectromagnetics", McGraw-Hill, 2007.					
Learning outcomes	LO-1: Determine static electric fields created by charge distributions. LO-2: Calculate electrostatic potential and capacitance and Electrostatic energy. LO-3: Formulate and apply boundary conditions and solve electrostatic boundary value problems. LO-4: Determine steady electric currents and resistance and static magnetic fields. LO-5: Formulate and analyze Faraday'slaw of induction. LO-6: Identify Maxwell’s equations and formulate uniform plane waves in lossless or lossy medium. LO-7: Identify the concept of polarization and formulate Electromagnetic power and Poynting’stheorem.					

Form IVb (English): Subjects by weeks

Weeks	**Subjects**

1. Week	Introduction and brief overview of vector calculus. Static electric fields, Fundamental postulates.
2. Week	Static Electric Fields Review
3. Week	Static Magnetic Fields Review
4. Week	Electromagnetic induction, Faraday's law, Maxwell Equations
5. Week	Electromagnetic Boundry conditions, Wave Equations and solutions, Time Harmonic Fields
6. Week	Plane waves, Group Velocity, Flow of electromagnetic power and Poyinting Vector
7. Week	Mid- term exam
8. Week	Poynting'stheorem; Polarization of plane waves
9. Week	Transverse EM waves, Line equtaions, wave caharecteristics,
10. Week	Transient on transmission lines, Smith Chart, Impendnce matching
11. Week	Waveguides, paralel plate, rectangular waveguides
12. Week	Waveguides, circular, dielectric waveguides, cavity resonnators
13. Week	Waveguides, circular, dielectric waveguides, cavity resonnators
14. Week	Radiation fields, elemental dipole and arrays and general
15. Week	Radiation fields, elemental dipole and arrays and general
16. Week	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			144
Total Workload/30 hours			4.88
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 208 - Signal and Systems	Spring	3	0	0	3	4
Prerequisites	None					
Course Language	English					
Course Type	Compulsory					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Assoc. Prof. Dr. Alaa ELEYAN					
Course objective	To understand the fundamentals of the signals, the analysis of linear time-invariant systems, Fourier representations of discrete and continuous time signals and frequency response.					
Course Content	Fundamentals of signals and systems, types of signals, basic signals and operations, properties of systems; Discrete-time and continuous-time impulse response, convolution theory, differential and difference equations; Fourier series and Fourier transform; Frequency response of LTI systems, sampling and reconstruction.					
References	1. Alan V. Oppenheim, Alan S. Willsky, Signals & Systems, Pearson. 2nd Ed. 1996. 2. Simon Haykin, Signals & Systems, Wiley, 2nd Ed. 2002					
Learning outcomes	After taking this course students will be able to; 1. Grasp the definition of signals and their types. 2. Differentiate b/w continuous-time and discrete-time signals and systems. 3. Identify systems and their properties. 4. Perform convolution. 5. Calculate Fourier series coefficients. 6. Perform periodic and non-periodic signals transforms. 7. Understand Sampling Theory.					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	Signals & Systems, types of signals, time-domain representations of continuous-time and discrete-time signals, signal operations, power and energy
2	Systems and their properties
3	LTI systems: Convolution Integral

4	LTI systems: Convolution Sum
5	Differential and Difference Equations, Block Diagrams
6	Differential and Difference Equations, Block Diagrams
7	Midterm Exam
8	Fourier Series Representation
9	Fourier Series Representation
10	Continuous-time Fourier Transform
11	Continuous-time Fourier Transform
12	Discrete-time Fourier Transform
13	Discrete-time Fourier Transform
14	Sampling Theory
15	Recitation
16	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	
Laboratory	0	
Quiz	2	%20
Fieldwork	0	
Practice	0	
Homework Assessment	2	%10
Presentation	0	
Project	0	
Seminar	0	
Mid-term Exams	1	%30
Final Exam	1	%40
Total	20	%100
Contribution of semester Works to success points	19	%60
Contribution of final exam to success points	1	%40
Total	20	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Quiz	2	6	12
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14

Presentation / Seminar Preparation			
Project			
Homework assignment	2	3	6
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	26	26
Total Workload			120
Total Workload/30 hours			120/30
ECTS			4.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
1					X
2					X
3			X		
4				X	
5			X		
6		X			
7				X	
8			X		
9			X		
10		X			
11		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE NAME

Course Name	EEE 301 – Telecommunications I
Course Type	Compulsory
Code	3
ECTS	6
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members
Prequisites	None
Semestre	Fall
Course Content	Introduction to communication systems, modulation techniques, limitations in communication. Spectral analysis. Energy and power spectral density. Transmission of signals over linear systems. The amplitude modulation (AM) techniques: Carrier amplitude modulation, suppressed carrier double sideband modulation, single sideband modulation, vestigial sideband modulation. Amplitude modulators, demodulators. Exponential modulation techniques: Frequency and phase (FM, PM) modulation. Frequency modulators, demodulators. Frequency division multiplexing (FDM). AM radio broadcasting, FM radio broadcasting, superheterodyne receivers. Stereo FM. Television broadcasting.
Learning Outcomes	After taking this course students will be able to; I. understand basic concepts and constraints in analog communications. II. analyze spectral properties of signals using Fourier series and transformation techniques. III. understand transmission through linear systems and describe distortions such as noise and interference in transmission channels. IV. understand different types of amplitude (AM, DSB, SSB, VSB) modulations, analyze of amplitude modulated signals in time and frequency domains, design of modulator/demodulator structures. V. understand types of exponential (FM, PM) modulations, analyze of exponential modulated signals in time and frequency domains, design of modulator/demodulator structures. VI. understand frequency division multiplexing, stereo FM and superheterodyne techniques. VII. have fundamental knowledge about radio-TV broadcasting using AM and/or FM
References	1- Communication Systems, 5th Ed, Simon Haykin, Michael Moher, John Wiley & Sons, 2009 2- Fundamentals of Communication Systems", 2nd Edition, John G. Proakis and Masoud Salehi, 2014

Learning and teaching strategies	Lecturing, discussion, report preparation and submission.
Evaluation	Laboratory activities 15%, Quizzes 15%, mid-term 30%, and final exam 40%
Course Language	English

Form IIIb (English): COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Negotiation Process	EEE301	Fall	3	0	2	4	6
Prequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery (face to face,distance learning)	Face to face						
Learning and teaching strategies	Lecturing, discussion, self-study, take home exams. Laboratory activities						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	To make students understand the negotiation process and prepare them to handle this process -To provide the concepts about analysis and design of analog communication systems. - To teach analog amplitude and exponential modulation types and their analysis methods. - To prepare students for advanced level digital communication courses.						
Learning outcomes	Students who pass the course will be able to: I. understand basic concepts and constraints in analog communications. II. analyze spectral properties of signals using Fourier series and transformation techniques. III. understand transmission through linear systems and describe distortions such as noise and interference in transmission channels. IV. understand different types of amplitude (AM, DSB, SSB, VSB) modulations, analyze of amplitude modulated signals in time and frequency domains, design of modulator/demodulator structures.						

	V. understand types of exponential (FM, PM) modulations, analyze of exponential modulated signals in time and frequency domains, design of modulator/demodulator structures. VI. understand frequency division multiplexing, stereo FM and superheterodyne techniques. VII. have elemantary knowledge about radio-TV broadcasting using AM and/or FM
Course Content	Introduction to communication systems, modulation techniques, limitations in communication. Spectral analysis. Energy and power spectral density. Transmission of signals over linear systems. The amplitude modulation (AM) techniques: Carrier amplitude modulation, suppressed carrier double sideband modulation, single sideband modulation, vestigial sideband modulation. Amplitude modulators, demodulators. Exponential modulation techniques: Frequency and phase (FM, PM) modulation. Frequency modulators, demodulators. Frequency division multiplexing (FDM). AM radio broadcasting, FM radio broadcasting, superheterodyne receivers. Stereo FM. Television broadcasting.
Mode of Delivery	In class / Distance / Hybrid
References	1- Communication Systems, 5th Ed, Simon Haykin, Michael Moher, John Wiley & Sons, 2009 2- Fundamentals of Communication Systems", 2nd Edition, John G. Proakis and Masoud Salehi, 2014

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction, Fundamental Concepts in Communication, Modulation, Limitations in Communication
2. Week	Spectral Analysis (Fourier Series)
3. Week	Spectral Analysis (Fourier Transform), Spectral Density
4. Week	Transmission of Signals Through Linear Channel, Distortion, Filters
5. Week	Amplitude Modulation (AM), Double Sideband Modulation (DSB)

6. Week	Single Sideband Modulation (SSB)
7. Week	Vestigial Sideband Modulation (VSB)
8. Week	Amplitude Modulators
9. Week	Demodulation, Superheterodyne Receivers, Frequency Division Multiplexing
10. Week	Angle Modulation (Frequency Modulation-FM and Phase Modulation-PM)
11. Week	Frequency Modulation
12. Week	Frequency Modulators
13. Week	Frequency Demodulation
14. Week	Radio and TV Broadcasting
15. Week	Repeat
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	14	%15
Quiz	4	%15
Fieldwork	0	%0
Practice	0	%0
Take Home Exam	0	%0
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	34	%100
Contribution of semester Works to success points	33	%60
Contribution of final exam to success points	1	%40
Total	34	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	3	42
Laboratory	14	3	42
Quiz	4	4	16
Specific practical training			
Take Home Exam			
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	25	25
Total Workload	34	55	145

Form VIIb (English): en

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.					X
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.				X	
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.			X		
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.				X	
5 Ability to design and conduct experiments, gather data, analyze and				X	

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually		X			
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions			X		
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in		X			

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERİNG AND ARCHITECTURE
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE NAME

Course Name	EEE 302 – Telecommunications II
Course Type	Compulsory
Code	3
ECTS	6
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members
Prequisites	None
Semestre	Fall
Course Content	Sampling theorem, Nyquist criterion, ideal, natural and flat-top sampling. Pulse modulation techniques: Pulse amplitude modulation, pulse width modulation, pulse position modulation, pulse code modulation, quantization, delta modulation, differential pulse code modulation. Baseband data transmission: Intersymbol interference, Nyquist channel, bandwidth efficiency. Matched-filter receiver, correlation receiver. Signal-space analysis, error performance analysis. Binary bandpass digital modulation techniques: Binary amplitude, frequency and phase shift keying. Introduction to M-ary bandpass modulation, information and entropy.
Learning Outcomes	After taking this course students will be able to; -Learn sampling theorem and its applications. -Investigate important pulse modulation techniques. -Recognize the conditions which prevent intersymbol-interference in bandlimited baseband channels. -Learn techniques for the design of optimum transceivers. -Learn binary bandpass modulation techniques. -Familiar the concepts of M-ary passband modulation, information and entropy.
References	1- Communication Systems, 5th Ed, Simon Haykin, Michael Moher, John Wiley & Sons, 2009 2- Fundamentals of Communication Systems", 2nd Edition, John G. Proakis and Masoud Salehi, 2014
Learning and teaching strategies	Lecturing, discussion, report preparation and submission.
Evaluation	Laboratory activities 15%, Quizzes 15%, mid-term 30%, and final exam 40%
Course Language	English

Form IIIb (English): COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Negotiation Process	EEE302	Fall	3	0	2	4	6
Prequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery (face to face,distance learning)	Face to face						
Learning and teaching strategies	Lecturing, discussion, self-study, take home exams. Laboratory activities						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	To make students understand the negotiation process and prepare them to handle this process To understand the basic concepts for the analysis of a digital communication system. To learn digital modulation techniques. To acquire the ability to design a basic digital communication system.						
Learning outcomes	After taking this course students will be able to; Learn sampling theorem and its applications. Investigate important pulse modulation techniques. Recognize the conditions which prevent intersymbol-interference in bandlimited baseband channels. Learn techniques for the design of optimum transceivers. Learn binary bandpass modulation techniques. Familiar the concepts of M-ary passband modulation, information and entropy.						
Course Content	Sampling theorem, Nyquist criterion, ideal, natural and flat-top sampling. Pulse modulation techniques: Pulse amplitude modulation, pulse width modulation, pulse position modulation, pulse code modulation, quantization, delta modulation, differential pulse code modulation. Baseband data transmission: Intersymbol interference, Nyquist channel, bandwidth efficiency. Matched-filter receiver, correlation receiver. Signal-space analysis, error performance analysis. Binary						

	bandpass digital modulation techniques: Binary amplitude, frequency and phase shift keying. Introduction to M-ary bandpass modulation, information and entropy.
Mode of Delivery	In class / Distance / Hybrid
References	1- Communication Systems, 5th Ed, Simon Haykin, Michael Moher, John Wiley & Sons, 2009 2- Fundamentals of Communication Systems", 2nd Edition, John G. Proakis and Masoud Salehi, 2014

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction, a review of Fourier analysis and probability, Sampling of baseband signals
2. Week	Sampling of bandpass signals, Pulse Amplitude Modulation (PAM)
3. Week	Time Division Multiplexing (TDM), Pulse Width Modulation (PWM), Pulse Position Modulation (PPM)
4. Week	Pulse Code Modulation (PCM), Quantization
5. Week	Delta Modulation (DM), Adaptive DM, Differential PCM
6. Week	Baseband pulse transmission, Matched filter, Error rate
7. Week	Intersymbol interference (ISI), Nyquist criterion
8. Week	Baseband M-ary PAM, Equalization
9. Week	AWGN channel, Maximum likelihood decoding, Correlation receiver
10. Week	Passband data transmission

11. Week	Amplitude shift keying (ASK), Phase shift keying (PSK)
12. Week	Frequency shift keying (FSK),Differential PSK, Error rate analysis
13. Week	Introduction to M-ary passband modulation
14. Week	14 Introduction to information and entropy concepts
15. Week	Repeat
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	14	%15
Quiz	4	%15
Fieldwork	0	%0
Practice	0	%0
Take Home Exam	0	%0
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	34	%100
Contribution of semester Works to success points	33	%60
Contribution of final exam to success points	1	%40
Total	34	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	3	42
Laboratory	14	3	42
Quiz	4	4	16
Specific practical training			
Take Home Exam			
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	25	25
Total Workload	34	55	145

Form VIIb (English): en

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.					X
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.				X	
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.			X		
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.				X	
5 Ability to design and conduct experiments, gather data, analyze and				X	

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually		X			
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions			X		
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in		X			

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 303-Electromagnetic Wave Theory	Fall	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Compulsory					
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Ercument KARAPINAR, PhD					
Course objective	To provide the basic principles of electromagnetics emphasizing on the characterization and the solution of static and dynamic electric and magnetic field problems					
Course Content	Steady electric currents. Static magnetic fields: BiotSavart law, Ampere's law, vector magnetic potential, inductance, magnetostatic force and energy. Faraday's law of induction. Wave concept. Maxwell's equations.Plane waves. Polarization. Poynting's vector.					
References	1. D.K.Cheng, Filed and Wave Electromagnetics, 2nd ed., David k.Cheng, AdissonWesley, 1989. 2. F.T.Ulaby, AppliedElectromagnetics, ,PrenticeHall, 2010. 3. Hayt, and J.A. Buck, "EngineeringElectromagnetics", McGraw-Hill, 2007.					
Learning outcomes	LO-1: Determine static electric fields created by charge distributions. LO-2: Calculate electrostatic potential and capacitance and Electrostatic energy. LO-3: Formulate and apply boundary conditions and solve electrostatic boundary value problems. LO-4: Determine steady electric currents and resistance and static magnetic fields. LO-5: Formulate and analyze Faraday'slaw of induction. LO-6: Identify Maxwell’s equations and formulate uniform plane waves in lossless or lossy medium. LO-7: Identify the concept of polarization and formulate Electromagnetic power and Poynting’stheorem.					

Form IVb (English): Subjects by weeks

Weeks	**Subjects**

1. Week	Introduction and brief overview of vector calculus. Static electric fields, Fundamental postulates.
2. Week	Static Electric Fields Review
3. Week	Static Magnetic Fields Review
4. Week	Electromagnetic induction, Faraday's law, Maxwell Equations
5. Week	Electromagnetic Boundry conditions, Wave Equations and solutions, Time Harmonic Fields
6. Week	Plane waves, Group Velocity, Flow of electromagnetic power and Poyinting Vector
7. Week	Mid- term exam
8. Week	Poynting'stheorem; Polarization of plane waves
9. Week	Transverse EM waves, Line equtaions, wave caharecteristics,
10. Week	Transient on transmission lines, Smith Chart, Impendnce matching
11. Week	Waveguides, paralel plate, rectangular waveguides
12. Week	Waveguides, circular, dielectric waveguides, cavity resonnators
13. Week	Waveguides, circular, dielectric waveguides, cavity resonnators
14. Week	Radiation fields, elemental dipole and arrays and general
15. Week	Radiation fields, elemental dipole and arrays and general
16. Week	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			144
Total Workload/30 hours			4.88
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

Course Description Form	
Course Code and Name	EEE 304 - Control Systems I
Course Semester	6
Catalog Content	Basic concepts in control systems, open and closed loop systems, Linear equations and Laplace transforms, mathematical model of systems, transfer function, block diagram, signal flow diagrams, stability test methods, error constants, root locus, P, PI and PID controllers, compensators
Textbook	1) Katsuhiko Ogata, "Modern Control Engineering", trans l: Palme Publishing, 2018
Supplementary Textbooks	2) Richard C. Dorf, Robert H. Bishop "Modern Control Systems", Prentice-Hall, 2011 3) Joseph J. Dıstefano, Allen R. Stubberud, Wan J. Wılliams "Feedback and Control Systems", Schaum's Outline Series, McGraw-Hill, 1995 4) Benjamin C. Kuo, Farid Golnaraghi "Automatic Control Systems", John Willey&Sons Inc.,2010
Credit	3
Prerequisites of the Course (*Attendance Requirements*)	There is no prerequisite or co-requisite for this course.
Type of the Course	Compulsory
Instruction Language	English
Course Objectives	To find the transfer functions of open and closed loop systems and to make stability analysis of the systems. In addition, to simulate feedback systems, to design PID controller.
Course Learning Outcomes	In this course, students learn the transfer function of open or closed loop system Students who take this course make to analyze the stability of the system which transfer function is known In this course, the student finds the constant errors of feedback system The student who attends this course simulates feedback systems in computer Students taking this course design PID controller
Instruction Methods	The mode of delivery of this course is Face to face
Weekly Schedule	1. Historical development of control systems, basic concepts in control systems, open and closed-loop control systems, feedback concept 2. Models of physical systems: electrical systems, mechanical systems, fluid systems, Transfer functions 3. Block Diagrams 4. Signal Flow Diagrams and Mason Gain Formula 5. The state-space definition, State Space Representation of Systems 6. Stability, Stability Testing Methods 7. Temporary and Permanent Status of Response System, 8. Detailed Analysis of the Second Order Systems, Midterm exam 9. Steady-state errors and Error Constants 10. Root Locus Method, properties and plotting the Root Locus, 11. Root Locus Method, properties and plotting the Root Locus 12. Basic control principles, the P, I and D controllers 13. Design of PI and PID Controller 14. Phase-progressive, phase-lag Compensator Design

Teaching and Learning Methods *(These are examples. Please fill which activities you use in the course)*	Weekly lecture hours Reading Activities Browsing the Internet, library work Material design, application Report preparing Midterm and midterm exam preparation Final exam and preparation for final exam

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	10
Application		
Projects	1	10
Practice		
Quiz		
Percent of In-term Studies (%)		60
Percentage of Final Exam to Total Score (%)		40

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	3	42
Weekly Tutorial Hours			
Reading Tasks	7	2	14
Studies	5	5	25
Material Design and Implementation	7	1	7
Report Preparing	5	1	5
Preparing a Presentation			
Presentations			
Midterm Exam and Preparation for Midterm Exam	3	2	6
Final Exam and Preparation for Final Exam	3	2	6
Other (should be emphasized)			
Total Workload			105
Total Workload / 25			4,2
Course Credit (ECTS)			4

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	Adequate knowledge in mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.			x		
2	An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.			x		
3	An ability to design a complex system, process, device, or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.			x		
4	Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems encountered in engineering applications; ability to use information technologies effectively.			x		
5	Ability to design, conduct experiments, collect data, analyze and interpret results for the study of complex engineering problems or discipline-specific research topics.			x		
6	Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.			x		
7	Ability to communicate effectively in oral and written Turkish; knowledge of at least one foreign language; Ability to write effective		x			
8	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.			x		

	9	To act in accordance with ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.	x					
	10	Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.	x					
	11	Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.	x					
The Course' Lecturer(s) And Contact Information	Prof Dr. İsmail COŞKUN, ismail.coskun@ankarabilim.edu.tr							

ANKARA SCIENCE UNIVERSITY
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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 305 - Electronics II	Fall	3	0	2	4	6
Prerequisites	None					
Course Language	English					
Course Type	Compulsory					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)						
Course objective	Introduction to transistors, comprehension of dc and ac analysis of transistor amplifier circuits, determination of amplifier frequency responses, circuit analysis of multi stage amplifiers, study of basic power amplifier configurations.					
Course Content	BJT amplifier circuits, common base connection, common emitter connection, common collector connection, FET (JFET, MOSFET and CMOS) amplifier circuits, dc analysis of amplifier circuits, circuit analysis of BJT and FET transistor ac models, hybrid equivalent circuit models, low, middle and high frequency responses of transistor amplifier circuits, multi stage amplifiers, power amplifiers.					
References	1. Adel S. SEDRA and Kenneth C. SMITH, Microelectronic Circuits, 5th Edition, Oxford: Int. Edition. 2. Jaeger, R.C., Microelectronic Circuit Design (1st Ed.), McGraw-Hill, 1997, ISBN: 0-07-032482-4. 3. Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory; Prentice Hall,2012.					
Learning outcomes	After taking this course students will be able to; 1. Defines the characteristics of transistors. 2. Constructs various transistor amplifier circuits and describes the basic functions. 3. Performs dc analysis of transistor circuits.					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	BJT amplifier circuits.

2	DC bias of BJT transistors circuits.
3	DC bias of BJT transistors circuits
4	FET amplifier circuits.
5	DC bias of FET transistors circuits.
6	DC bias of FET transistors circuits.
7	Midterm Exam.
8	BJT small signal analysis.
9	BJT small signal analysis
10	FET small signal analysis.
11	FET small signal analysis
12	Multi stage amplifiers and frequency concept.
13	Multi stage amplifiers and frequency concept
14	Power amplifiers.
15	Recitation
16	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	
Laboratory	14	%15
Quiz	2	%15
Fieldwork	0	
Practice	0	
Homework Assessment	0	
Presentation	0	
Project	0	
Seminar	0	
Mid-term Exams	1	%30
Final Exam	1	%40
Total	32	%100
Contribution of semester Works to success points	31	%60
Contribution of final exam to success points	1	%40
Total	32	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory	14	2	28
Quiz	2	10	20
Specific practical training			
Field activities			

Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	2	28
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	26	26
Final Exam (Study duration)	1	30	30
Total Workload			174
Total Workload/30 hours			174/30
ECTS			6.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
1					X
2					X
3			X		
4				X	
5			X		
6		X			
7				X	
8			X		
9			X		
10		X			
11		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 306-Microprocessors	Spring	3	0	2	4	5
Prerequisites	None					
Course Language	English					
Course Type	Compulsory					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Assoc. Prof. Dr. Alaa ELEYAN					
Course objective	Main objective is to understand the working principles of the Intel 80x86 microprocessor and how to perform input/output device programming and debug in assembly language.					
Course Content	Basic computer organization and introductory microprocessor architecture. Introduction to assembly language programming: basic instructions, program segments, registers and memory. Control transfer instructions; arithmetic, logic instructions; rotate instructions and bitwise operations in assembly language. Basic computer architecture: pin definitions and supporting chips. Memory and memory interfacing. Basic I/O and device interfacing: I/O programming in assembly and programmable peripheral interface (PPI). Interfacing the parallel and serial ports.					
References	1. The 80x86 IBM PC and Compatible Computers, M.A. Mazidi and J.G. Mazidi, 4th edition, Prentice Hall, 2003 2. The 80x86 Family, Design, Programming and Interfacing, 3rd edition,Prentice Hall, 2002. 3. The Intel Microprocessors, Architecture, Programming and Interfacing, Barry B. Brey, Prentice Hall, 1994.					
Learning outcomes	After taking this course students will be able to; 1. Understand the main components and working principles of the Intel 80x86 microprocessor, 2. Program and debug in assembly language, 3. Understand the basic computer architecture, 4. Understand interrupts and their applications, 5. Perform input/output device interfacing/programming in assembly, 6. Understand the memory organization and interfacing, 7. Understand the properties and interfacing of the parallel and serial ports.					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	Introduction and the 80x86 Microprocessor
2	Introduction and the 80x86 Microprocessor
3	Assembly Language Programming
4	Assembly Language Programming
5	Assembly Language Programming
6	BIOS and DOS Programming in Assembly
7	Midterm Exam
8	Basic Computer Architecture
9	Memory and Memory Interfacing
10	Input/Output and Device Interfacing
11	Input/Output and Device Interfacing
12	Interrupts and Interrupt Controllers
13	Interfacing the Parallel Port
14	Interfacing the Serial Port
15	Recitation
16	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	
Laboratory	14	%15
Quiz	2	%15
Fieldwork	0	
Practice	0	
Homework Assessment	0	
Presentation	0	
Project	0	
Seminar	0	
Mid-term Exams	1	%30
Final Exam	1	%40
Total	32	%100
Contribution of semester Works to success points	31	%60
Contribution of final exam to success points	1	%40
Total	32	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload

Course Duration (x14)	14	3	42
Laboratory	14	2	28
Quiz	2	8	16
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	22	22
Final Exam (Study duration)	1	26	26
Total Workload			148
Total Workload/30 hours			148/30
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
1					X
2					X
3			X		
4				X	
5			X		
6		X			
7				X	
8			X		
9			X		
10		X			
11		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

DERS TANIMLAMA FORMU	
Dersin Kodu ve Adı	EEE 307 Electromechanical Energy Conversion I
Dersin Yarıyılı	5
Dersin Katalog Tanımı (İçeriği)	Manyetik malzemelerin, manyetik devrelerin ve elektrik devresi ile manyetik devre arası ilişkinin analizi. Elektromekanik enerji dönüşüm prensipleri ve denklemleri, DA makinelerinin yapılarını, çalışma prensipleri, DA generatörlerinin çıkış karakteristikleri, DA motorlarının hız-moment karakteristikleri, DA motorlarının kararlı durum analizi ve hız kontrolü. Transformatörlerin yapılarını ve çalışma prensipleri, bir fazlı, çok fazlı, oto ve özel transformatörlerin yapıları, çalışma prensipleri, transformatör bağlantıları ve bağlantı çeşitlerini, polarite tayini ve paralel bağlama şartları, transformatör kayıplarını, gerilim regülasyonunu ve verimi.
Temel Ders Kitabı	Elektrik Makinaları I, Güngör Bal Elektrik Makinalarının Temelleri, Stephen J. Chapman
Yardımcı Ders Kitapları	Elektrik Makineleri, Fitzgerald, Charles Kingsley, StephenD.Umans, ElectricalMachineswith MATLAB, Turan Gönen
Dersin Kredisi (AKTS)	4
Dersin Önkoşulları **(Ders devam zorunlulukları, bu maddede belirtilmelidir.)**	Gazi Üniversitesi tarafından belirlenen devam süresi zorunludur
Dersin Türü	Zorunlu
Dersin Öğretim Dili	English
Dersin Amacı ve Hedefi	Doğru akım motorları ve doğru akım generatörlerinin kararlı durum çalışma prensipleri hakkında bilgi vermek.Bir fazlı ve üç fazlı transformatörlerin kararlı durum çalışma prensipleri hakkında bilgi verilmesi.
Dersin Öğrenim Çıktıları	1. Manyetik malzemelerin ve manyetik devrelerin davranışını tanıyabilir. 2. DA makinelerinin yapılarını, çalışma prensiplerini DA generatörlerinin-motorların çıkış karakteristiklerini yorumlayabilir. 3. Transformatörlerin yapılarını ve çalışma prensiplerini bilir. 4. Bir fazlı, çok fazlı, oto ve özel transformatörlerin yapıları, çalışma prensiplerini tanımlayabilir. 5. Elektromekanik enerji dönüşüm prensipleri ve denklemlerini tanımlayabilir.
Dersin Veriliş Biçimi	Bu ders sadece yüz yüze eğitim şeklinde yürütülmektedir

Dersin Haftalık Dağılımı

Hafta	Modüller/İçerik/Konular
1	Manyetik alan, manyetik alan kaynakları
2	Manyetik devreler
3	Transformatörler
4	Bir fazlı, çok fazlı, oto transformatörleri yapıları, çalışma prensipleri
5	Transformatör bağlantıları ve bağlantı çeşitleri
6	Polarite tayini ve bağlantıları
7	Transformatörlerin paralel bağlanma şartları ve paralel bağlantısı
8	Ara Sınav, Transformatörlerin kayıpları
9	Transformatörlerde kısa devre gerilim yüzdesi, regülasyon ve verim
10	Elektromekanik enerji dönüşüm prensipleri
11	Elektromekanik enerji dönüşüm dinamik denklemleri
12	DA makineleri yapıları
13	DA makinelerinin çalışma prensipleri, performansı
14	DA makinelerinin kararlı durum analizi ve hız kontrolü

Öğretim Faaliyetleri
(Burada belirtilen faaliyetler için harcanan zaman krediyi belirleyecektir. Dikkatli doldurulması gerekmektedir.)

Haftalık teorik ders saati 3
Okuma Faaliyetleri 2
İnternetten tarama, kütüphane çalışması 2
Ara sınav ve ara sınava hazırlık 4
Final sınavı ve final sınavınahazırlık 4

Değerlendirme Ölçütleri

	Sayısı	Toplam Katkısı (%)
Ara sınav	1	50
Ödev	1 ya da 2	5
Uygulama		
Projeler		
Pratik		
Kısa Sınav	1 ya da 2	5
Dönemiçi Çalışmaların Yıl İçi Başarıya Oranı (%)		60
Finalin Başarıya Oranı (%)		40

	Devam			
Dersin İş Yükü	**Etkinlik**	**Toplam Hafta Sayısı**	**Süre (Haftalık Saat)**	**Dönem Sonu Toplam İş Yükü**
	Haftalık teorik ders saati	14	3	42
	Haftalık uygulamalı ders saati			
	Okuma Faaliyetleri	13	1	13
	İnternetten tarama, kütüphane	11	1	11
	Materyal tasarlama, uygulama			
	Rapor hazırlama			
	Sunu hazırlama			
	Sunum			
	Ara sınav ve ara sınava hazırlık	3	5	15
	Final sınavı ve final sınavına hazırlık	4	6	24
	Diğer			
	Toplam iş yükü			105
	Toplam iş yükü/ 25			4.2
	Dersin AKTS Kredisi			4

Ders Çıktıları ile Program Çıktıları Arasındaki Katkı Düzeyi

No	Program Çıktıları	2	3	4	5
1	Matematik, fen bilimleri ve ilgili mühendislik disiplinine özgü konularda yeterli bilgi birikimi; bu alanlardaki kuramsal ve uygulamalı bilgileri, karmaşık mühendislik problemlerinde kullanabilme becerisi.			x	
2	Karmaşık mühendislik problemlerini saptama, tanımlama, formüle etme ve çözme becerisi; bu amaçla uygun analiz ve modelleme yöntemlerini seçme ve uygulama becerisi.			x	
3	Karmaşık bir sistemi, süreci, cihazı veya ürünü gerçekçi kısıtlar ve koşullar altında, belirli gereksinimleri karşılayacak şekilde tasarlama becerisi; bu amaçla modern tasarım yöntemlerini uygulama becerisi.			x	
4	Mühendislik uygulamalarında karşılaşılan karmaşık problemlerin analizi ve çözümü için gerekli olan modern teknik ve araçları geliştirme, seçme ve kullanma becerisi; bilişim teknolojilerini etkin bir şekilde kullanma becerisi.			x	
5	Mühendislik problemlerinin veya disipline özgü araştırma konularının incelenmesi için deney tasarlama, deney yapma, veri toplama, sonuçları analiz etme ve yorumlama becerisi.			x	

	6	Disiplin içi takımlarda etkin biçimde çalışabilme becerisi			x		
	7	Disiplinler arası takımlarda etkin biçimde çalışabilme becerisi			x		
	8	Türkçe sözlü ve yazılı etkin iletişim kurma becerisi; en az bir yabancı dil bilgisi.			x		
	9	Etkin rapor yazma ve yazılı raporları anlama, tasarım ve üretim raporları hazırlayabilme, etkin sunum yapabilme, açık ve anlaşılır talimat verme ve alma becerisi.			x		
	10	Yaşam boyu öğrenmenin gerekliliği bilinci; bilgiye erişebilme, bilim ve teknolojideki gelişmeleri izleme ve kendini sürekli yenileme becerisi.			x		
	11	Etik ilkelerine uygun davranma, mesleki ve etik sorumluluk bilinci; mühendislik uygulamalarında kullanılan standartlar hakkında bilgi.			x		
Dersi Verecek Öğretim Eleman(lar)ı ve İletişim Bilgileri	Prof. Dr. İsmail Coşkun, İsmail.coskun@ankarabilim.edu.tr						

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COURSE SYLLABUS

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 309- Digital Signal Processing	Fall	3	0	2	4	5
Prerequisites	None					
Course Language	English					
Course Type	Compulsory					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Assoc. Prof. Dr. Alaa ELEYAN					
Course objective	The main objective of this course is to introduce the fundamental concepts of mathematical tools in digital signal processing and linear systems analysis with examples from signal processing, communications, and control.					
Course Content	Representation, analysis, and design of discrete time signals and systems. Discrete time processing of continuous time signals. Frequency domain representations: Fourier series and transforms. Decimation, interpolation, and sampling rate conversion. Z-Transfrom, Flowgraph structures for DT systems. Time and frequency domain design techniques for recursive (IIR) and non-recursive (FIR) filters. Linear prediction. Connection between continuous and discrete time frequency representations. Discrete Fourier transform (DFT) and fast Fourier transform (FFT). Short time Fourier analysis and filter banks. Multi-rate techniques.					
References	1. A. V. Oppenheim, R. W. Schafer, "Discrete Time Signal Processing", 3rd Ed., Pearson International Edition, Upper Saddle River, NJ 07458, 2010 2. J. G. Proakis, D. G. Manolakis, Digital Signal Processing. Principles, Algorithms and Applications, fourth edition, Prentice Hall, 2007.					
Learning outcomes	After taking this course students will be able to; 1. Understand the theoretical foundations of digital signal processing systems 2. Design FIR and IIR type digital filters, 3. Calculate Z-transfrom and its inverse, 4. Describe the discrete Fourier transform (DFT), its applications and its implementation by FFT techniques. 5. Explain the significance of digital signal processing in the fields of Electronics and Telecommunications Engineering, 6. Use Matlab package and its signal processing toolbox for analyzing and designing digital signal processing systems (i.e. digital filters).					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	Introduction, review of continuous time signal and system concepts
2	Discrete Time Signals and Systems; convolution
3	Difference equations and discrete time Fourier transforms
4	DTFTs & CTFTs of periodic and sampled signals
5	Introduction to multirate DSP: decimation & interpolation
6	Z-transform and its properties
7	Midterm Exam
8	İnverse Z transforms
9	The DFT and circular convolution
10	Introduction to fast Fourier transform algorithms; FFT structures, algorithms, and computational considerations
11	Introduction to digital filter implementation; IIR filter structures and implementation
12	FIR structures and implementation; IIR filter design; use of analog prototypes; IIR design examples;
13	FIR design using windows; Computer aided FIR design: The Parks McClellan algorithm
14	System frequency response; system function; stability; system examples
15	Spectral analysis with the DFT, Short time Fourier analysis; modulated filter bank
16	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	
Laboratory	14	%15
Quiz	2	%15
Fieldwork	0	
Practice	0	
Homework Assessment	0	
Presentation	0	
Project	0	
Seminar	0	
Mid-term Exams	1	%30
Final Exam	1	%40
Total	32	%100
Contribution of semester Works to success points	31	%60
Contribution of final exam to success points	1	%40
Total	32	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory	14	2	28
Quiz	2	8	16
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	22	22
Final Exam (Study duration)	1	26	26
Total Workload			148
Total Workload/30 hours			148/30
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1					X
2					X
3			X		
4				X	
5			X		
6		X			
7				X	
8			X		
9			X		
10		X			
11		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

Course Description Form	
Course Code and Name	EEE 310 Electromechanical Energy Conversion II
Course Semester	6
Catalog Content	Constitution of rotating magnetic field and three-phase windings, working principle of induction motors, obtaining equivalent circuits of induction machines, analysis of 4-zone operating modes of induction machines, steady state characteristics of induction machines, speed control of induction machines, speed control of induction machines, structures of one phase induction machines Harmonics in synchronous machines, armature reaction in synchronous generators and motors, phasor diagrams of equivalent circuits of synchronous machines, Characteristics of synchronous machines in idle and load, Short circuit rate, short circuit current, synchronization, starting synchronous motors Active, reactive power setting, rotation torque in synchronous machines .
Textbook	1. Electrical Machines I, Güngör Bal 2. Fundamentals of Electrical Machines, Stephen J. Chapman
Supplementary Textbooks	3. Electric Machinery, Fitzgerald, Charles Kingsley, Stephen D.Umans, 4. Electrical Machines with MATLAB, Turan Gönen
Credit	4
Prerequisites of the Course (Attendance Requirements)	There is no prerequisite or co-requisite for this course.
Type of the Course	Selective
Instruction Language	Turkish
Course Objectives	Investigation of steady state operating modes of three phase induction motors, and induction generator operation. Investigation of structure and working principle of single-phase induction motors. Steady state operation of synchronous generators, load analysis, equivalent circuits and synchronous motors.
Course Learning Outcomes	1. Learns three-phase distributed winding principles, nature of the magnetic fields produced in three-phase ac machines. 2. Knows basic concepts on three-phase induction machines and synchronous machines. 3. Uses the techniques to derive the performance characteristics of three-phase machines based on steady-state equivalent circuit models and phasor diagram. 4. Understands speed control techniques applied to three-phase AC machines 5. Learns operating principles of single-phase AC motors.
Instruction Methods	The mode of delivery of this course is Face to face
Weekly Schedule	1. Week Introduction to AC machines 2. Week Principles of three-phase distributed winding, rotating magnetic fields, winding factors, induced emfs 3. Week Operation principles, steady-state equivalent circuit model of three-phase induction machines 4. Week Torque-speed characteristics of induction motors 5. Week Parameter determination tests for induction motors - Blocked-rotor and no-load tests 6. Week Four-quadrant operation of induction machines 7. Week Ratings and efficiency, starting methods of induction motors 8. Week Speed control techniques for induction motors, Midterm exam 9. Week Single-phase induction motors: equivalent circuit model, steady-state operation 10. Week Starting of split-phase motors, capacitor type and shaded pole motors

	11. Week Synchronous machine - operation principles 12. Week Synchronous machine - structures-cylindrical and salient rotor types 13. Week Deriving of equivalent circuit model and phasor diagrams of synchronous machine 14. Week Open- and short-circuit test of synchronous machines, excitation systems and voltage regulation
Teaching and Learning Methods *(These are examples. Please fill which activities you use in the course)*	Weekly lecture hours Reading Activities Internet browsing, library work Midterm and midterm exam preparation Final exam and preparation for final exam

Assessment Criteria

	Numbers	Total Weighting (%)
Midterm Exams	1	45
Assignment		
Application		
Projects		
Practice		
Quiz	2	10
Percent of In-term Studies (%)		60
Percentage of Final Exam to Total Score (%)		40
Attendance		5

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	3	42
Weekly Tutorial Hours			
Reading Tasks	12	2	24
Studies	10	2	20
Material Design and Implementation			
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preparation for Midterm Exam	3	3	9
Final Exam and Preparation for Final Exam	3	3	9
Other (should be emphasized)	2	2	4
Total Workload			108
Total Workload / 25			4,32
Course Credit (ECTS)			4

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	Adequate knowledge in mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.			X		
2	An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.			X		
3	An ability to design a complex system, process, device, or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.		X			
4	Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems encountered in engineering applications; ability to use information technologies effectively.	X				
5	Ability to design, conduct experiments, collect data, analyze and interpret results for the study of complex engineering problems or discipline-specific research topics.			X		
6	Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.	X				
7	Ability to communicate effectively in oral and written Turkish; knowledge of at least one foreign language; Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instruction and receiving skills.					
8	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
9	To act in accordance with ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.	X				
10	Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.	X				
11	Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.	X				

The Course's Lecturer(s) and Contact Information

Prof. Dr. İsmail Coskun, ismail.coskun@ankarabilim.edu.tr

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COURSE SYLLABUS

COURSE NAME

Course Name	EEE 314 – Optical Fiber Communications
Course Type	Elective
Code	3
ECTS	5
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members
Prequisites	None
Semestre	Fall
Course Content	A comprehensive description of the technology of fiber optical communication system. A balanced discussion between component operation and system design consideration. Performance parameters and fabrication problems, lasers, LED modulation and detector responses. Link budget analysis. Advantages of fiber optics, recent developments and applications. .
Learning Outcomes	After taking this course students will be able to; Learn historical backgorund of optical fiber communications. Learn Essentials of geometrical optics and wave optics concepts Learn techniques for the design of optical communication systems. Learn limitations of optical communications. Familiar with the concepts of optical networks.
References	1- Communication Systems, 5th Ed, Simon Haykin, Michael Moher, John Wiley & Sons, 2009 2- Fundamentals of Communication Systems", 2nd Edition, John G. Proakis and Masoud Salehi, 2014
Learning and teaching strategies	Lecturing, discussion, report preparation and submission.
Evaluation	Laboratory activities 15%, Quizzes 15%, mid-term 30%, and final exam 40%
Course Language	English

Form IIIb (English): COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Negotiation Process	EEE302	Fall	3	0	2	4	6
Prequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery (face to face,distance learning)	Face to face						
Learning and teaching strategies	Lecturing, discussion, self-study, take home exams. Laboratory activities						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	After completing this course the students should be able to: 1. Understand fiber optic concept to information transmission. 2. Identify the elements of an optical fiber transmission link. 3. Understand optical fiber structure, wave guiding and fabrication 4. Understand, compute and simulate the modes in slab waveguide, step index fiber and graded index fiber. 5. Calculate and simulate the attenuation and signal degradation due to intermodal and intramodal distortion. 6. Understand the structure, the performance and the signal analysis of optical sources. 7. Understand the structure, the performance and signal analysis of optical detectors. 8. Calculate power coupling losses due to connectors, splices, source output pattern and fiber numerical aperture. 9. Design optimum single mode and multimode fiber link. 10. Design and analyze optical receivers.						
Learning outcomes	After taking this course students will be able to; Learn historical backgorund of optical fiber communications. Learn Essentials of geometrical optics and wave optics concepts Learn techniques for the design of optical communication systems. Learn limitations of optical communications. Familiar with the concepts optical networks.						
Course Content	Introduction, Historical background, Optical Fibers, Geometrical-Optics, Wave Propagation in optical fibers, Chromatic Dispersion, Polarization Mode Dispersion, Dispersion-Induced Limitations, Fiber Losses, Nonlinear Optical Effects, Optical Transmitters, Optical						

	Receivers, Optical Amplifiers, System Applications, Multichannel Systems, Coherent Lightwave Systems: Homodyne and heterodyne detection, Optical Transmission Enabling Technologies, Optical Networks: LANs, MANs, Long-Haul Networks, Design Guidelines
Mode of Delivery	In class / Distance / Hybrid
References	1- Govind P. Agrawal, Fiber-Optic Communication Systems, John Wiley & Sons, 4th Ed. 2- Optical Fiber Communications, Gerd Keiser, McGraw-Hill Higher Education 4/e 3- Optical Fiber Communications by John Senior, 3rd Edition, Prentice Hall, 2009.

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction, Historical background
2. Week	Optical Fibers, Geometrical-Optics,
3. Week	Wave Propagation, Chromatic Dispersion
4. Week	Polarization Mode Dispersion, Dispersion-Induced Limitations
5. Week	Fiber Losses, Nonlinear Optical Effects
6. Week	Optical Transmitters, Light-Emitting Diodes, Semiconductor Lasers
7. Week	Laser Characteristics, Transmitter Design
8. Week	Optical Receivers, Common Photodetectors

9. Week	Receiver Design, Receiver Noise, Receiver Sensitivity
10. Week	Optical Amplifiers: Semiconductor Optical Amplifiers, Raman Amplifiers, Erbium-Doped Fiber Amplifiers
11. Week	Multichannel Systems: WDM Lightwave Systems, Time-Division Multiplexing, Subcarrier Multiplexing, Orthogonal Frequency Division Multiplexing (OFDM), Code-Division Multiplexing
12. Week	Coherent Lightwave Systems: Homodyne and heterodyne detection
13. Week	Optical Transmission Enabling Technologies: Dispersion Management, Modulation Schemes, Nonlinearity Management
14. Week	Optical Networks: LANs, MANs, Long-Haul Networks
15. Week	Repeat
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%
Quiz	2	%10
Fieldwork	0	%0
Practice	0	%0
Take Home Exam	2	%10
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%50
Total	20	%100
Contribution of semester Works to success points	19	%60
Contribution of final exam to success points	1	%50
Total	20	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	3	42
Laboratory			
Quiz	2	6	12
Specific practical training			
Take Home Exam	2	5	10
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	25	25
Final Exam (Study duration)	1	30	30
Total Workload	20	69	119

Form VIIb (English): en

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.					X
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.				X	
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.			X		
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.			X		
5 Ability to design and conduct experiments, gather data, analyze and			X		

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually				X	
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions			X		
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in				X	

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 316-Microwave Engineering	Fall	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Elective					
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Ercument KARAPINAR, PhD					
Course objective	This course is aimed to provide the basic knowledge and design skills for high radio frequency applications and in general microwave techniques used in ground and space communications, radars and other similar areas. At the end of this course, the student will learn the essential concepts and tools needed for designing and employing devices and components mostly used in Microwave Engineering areas outlined above.These are: • basic concepts used in identifying the properties of microwave networks using matrix notations • the concept of stability and gain in microwave systems • basic design criteria concerning microwave amplifiers, stability, gain, noise and bandwidth. Design of microwave systems using of microwave simulators • properties and design of microwave oscillators • design and properties of microwave systems.					
Course Content	Matrix representation of microwave networks. Properties of scattering parameters. Generalized scattering parameters. Microwave transistor amplifier design; gain stability, noise. Microwave transistor oscillator and mixer design. Simplified signal flow graph analysis. Coupled lines, directional coupler, Schiffman's differential phase shifter. Hybrids and power dividers. Richard's frequency: transformation, Richards' theorem. Kuroda's identifies.					
References	Textbook: David M. Pozar, Microwave Engineering, 4th Edition, ISBN: 978-1-118-29813-8, 2011, John Wiley&Sons. Supplementary: Kyung-Whan Yeom, Microwave Circuit Design: A Practical Approach Using ADS, ISBN-10: 0134086783, ISBN-13: 9780134086781, 2015, Prentice Hall.					
Learning outcomes	Student, who passed the course satisfactorily will be able to: • understand transmission line theory and technologies • understand and use matrix representation of microwave networks • understand impedance matching and design matching networks • understand resonators and Q-factors					

	• understand and design passive microwave circuits such as power splitters, couplers, filters and design them according to the given specifications and measure their relevant properties • use CAD tools to design passive microwave devices, including optimization, layout, manufacturing, prototyping and measurement.

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Plane waves, wave equations and boundary conditions
2. Week	Maxwell's equations in waveguides
3. Week	TEM, TE and TM modes
4. Week	Field analysis of transmission lines
5. Week	Distributed circuit analysis of transmission lines
6. Week	Loaded transmission lines and power flow
7. Week	Midterm Exam I
8. Week	Impedance Matching Techniques
9. Week	Usage of Smith Chart
10. Week	Waveguides
11. Week	Basics of microwave measurements
12. Week	Impedance and scattering matrix
13. Week	Impedance and scattering matrix

14. Week	Wideband matching circuits
15. Week	Preparation for Final exam
16. Week	Final exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			144
Total Workload/30 hours			4.88
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 318- Matlab Applications in Electrical Engineering	Spring	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Elective					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)						
Course objective	The objective of the course is to introducte engineering students to matlab programming cababilities as apowerful tool for simulation and modelling of different problems in various areas of electrical and electrical engineering discipline such as circuit theory, electronics, power systems, signal processing, image processing, filtering and control systems.					
Course Content	Loops, conditions and cases, if-then-else statements, logical operations, functions, arrays/vectors/matrices, plotting and visualization of data, printing tables, document preparation, writing pseudo-code, toolboxes, advanced graphics, GUIs, and real world applications					
References	1. Holly Moore, MATLAB for Engineers, Global Edition, 5th Edition, 2019, Pearson 2. William Palm, MATLAB for Engineering Applications 4th Edition, McGraw-Hill Education, 2018 3. Brian Hahn, Daniel Valentine, Essential MATLAB for Engineers and Scientists 7th Edition, Academic Press, 2019					
Learning outcomes	After taking this course students will be able to; 1. Understand the MATLAB environment 2. Understand the principles of Programming. 3. Translate mathematical methods to MATLAB code 4. Solve real world problems using Matlab 5. Use the MATLAB GUI effectively					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	MATLAB Environment
2	Built-In MATLAB Functions & Plotting
3	Manipulating MATLAB Matrices
4	Logical Functions, Selection & Repetition Structures
5	User-Controlled Input And Output
6	User-Defined Functions
7	Midterm Exam
8	Symbolic Mathematics
9	Advanced Graphics
10	Creating Graphical User Interfaces
11	Matlab in Image Processing
12	Matlab in Control Systems
13	Matlab In Numerical Analysis
14	Projects Presentations
15	Recitation
16	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	
Laboratory	0	
Quiz	0	
Fieldwork	0	
Practice	0	
Homework Assessment	0	
Presentation	0	
Project	1	%30
Seminar	0	
Mid-term Exams	1	%30
Final Exam	1	%40
Total	17	%100
Contribution of semester Works to success points	16	%60
Contribution of final exam to success points	1	%40
Total	17	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Quiz			
Specific practical training			

Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14
Presentation / Seminar Preparation			
Project	1	48	48
Homework assignment			
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	26	26
Total Workload			150
Total Workload/30 hours			150/30
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
1				X	
2					X
3					X
4		X			
5			X		
6		X			
7		X			
8	X				
9	X				
10	X				
11		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE SYLLABUS

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 320- Neural Networks	Spring	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Elective					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)						
Course objective	In this course, it is aimed to examine the mathematical principles underlying neural networks and to gain practical knowledge and skills by applying these techniques to specific real-life problems.					
Course Content	The structure of the brain. Learning in machines. Pattern recognition. Classification techniques. Linear classifiers. Basic Neuron. Modeling the single neuron. The perceptron. The multilayer perceptron. Kohonen self-organizing network. Hopfield network. Neural network classifiers. Adaptive resonance theory. Cellular neural networks.					
References	1. Simon Haykin, Neural Networks and Learning Machines, 3rd edition, 2009. 2. J. M. Zurada, Introduction to Artificial Neural Systems, West Pub. Co., S. Paul, 1992 3. Christopher Bishop, Neural Networks for Pattern Recognition, 1995.					
Learning outcomes	After taking this course students will be able to; 1. Explain the mathematical principles and algorithms of artificial neural networks 2. Solve machine learning problemS using appropriate structured neural network algorithms. 3. İmplement artificial neural network methods using software 4. Apply a structured neural network algorithm to a real-life problems					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	Introduction.
2	Neuron model, neural network structures.
3	Learning rules and tasks.

4	Perceptron, single layer feedforward networks.
5	Multilayer feedforward networks, least mean square algorithm, error back-propagation.
6	Recurrent (Hopfield) networks.
7	Midterm Exam
8	Self-organizing networks.
9	Support Vector Machines.
10	Radial basis functions.
11	Simulated Annealing, Spin-Glass Theory.
12	Associative memory, analysis and design
13	Projects Presentations
14	Projects Presentations
15	Recitation
16	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	
Laboratory	0	
Quiz	0	
Fieldwork	0	
Practice	0	
Homework Assessment	0	
Presentation	0	
Project	1	%30
Seminar	0	
Mid-term Exams	1	%30
Final Exam	1	%40
Total	17	%100
Contribution of semester Works to success points	16	%60
Contribution of final exam to success points	1	%40
Total	17	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Quiz			
Specific practical training			
Field activities			

Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14
Presentation / Seminar Preparation			
Project	1	48	48
Homework assignment			
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	26	26
Total Workload			150
Total Workload/30 hours			150/30
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
1				X	
2					X
3					X
4		X			
5			X		
6		X			
7		X			
8	X				
9	X				
10	X				
11		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE SYLLABUS

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 322-Programmable Logic Controller	Spring	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Elective					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)						
Course objective	This course covers basic to intermediate theory & applications of programmable logic controllers. PLCs are used in many industrial and commercial processes. It is expected that some technicians will be required to install, troubleshoot, program & modify PLCs and PLC controlled systems. The intent of this course is to have students develop the basic technician level skills required by industry.					
Course Content	A study in programmable controllers (PLC). Topics include processor units, numbering systems, memory organization, relay type devices, timers, counters, data manipulators, and programming.					
References	1. John W. Webb and Ronald A. Reis, Programmable Logic Controllers: Principles and Applications, Prentice-Hall. 2. Petruzella, Frank D., Programmable Logic Controllers: 2/e, 1998, McGraw-Hill. 3. S7-200, PLC Manual of Siemens for Instructions.					
Learning outcomes	After taking this course students will be able to; 1. Understand the fundamentals Programmable Logic Controllers systems. 2. Identify the types of PLC communications and network systems. 3. Design, edit, test, and document PLC Ladder Logic Programs. 4. Diagnose and troubleshoot PLCs using different brands/software. 5. Specify safety consideration for personnel, field devices and automated equipment.					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	PLC : Overview and Control System Components

2	Relay Logic Diagrams
3	PLC Programming
4	Programming Logic Gate Functions in PLCs
5	PLC Timer Functions
6	PLC Counter Functions
7	Midterm Exam
8	PLC Math Functions
9	PLC Logic Functions
10	PLC Compare, Jump, and MCR Functions
11	PLC Subroutine Functions
12	PLC Sequencer Functions
13	PLC Interrupts
14	Process Control and troubleshooting
15	Recitation
16	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	
Laboratory	0	
Quiz	0	
Fieldwork	0	
Practice	0	
Homework Assessment	0	
Presentation	0	
Project	1	%30
Seminar	0	
Mid-term Exams	1	%30
Final Exam	1	%40
Total	17	%100
Contribution of semester Works to success points	16	%60
Contribution of final exam to success points	1	%40
Total	17	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Quiz			
Specific practical training			
Field activities			

Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14
Presentation / Seminar Preparation			
Project	1	48	48
Homework assignment			
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	26	26
Total Workload			150
Total Workload/30 hours			150/30
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
1				X	
2					X
3					X
4		X			
5			X		
6		X			
7		X			
8	X				
9	X				
10	X				
11		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 450- Antennas and Propagation	Fall	3	0	2	4	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Elective					
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Ercument KARAPINAR, PhD					
Course objective	It is aimed to give the following topics to the students; Fundametals of radiation theory, Antenna parameters, Radiation from wire antennas (current elements) Radiation from Aperture antennas and equivalence theorem, Antenna arrays, Receiving antennas, reciprocity theorem, noise, radar range equation, Propagation mechanisms of electromagnetic waves from ELF band to EHF band, Parameters of signal propagation to form a solid foundation in radiation and propagation of electromagnetic waves, so that the students can apply the principles of radiation and propagation to the problems which they may encounter within their studies/thesis/projects.					
Course Content	Fundamentals of radiation theory, Antenna parameters, Radiation from elementary dipoles and loops, Radiation integrals for current (wire) antennas, Antenna arrays, Radiation from apertures and equivalence theorem, Receiving antennas and noise, Radar range equation and Friis transmission equation, Fundamentals of electromagnetic wave propagation, and introduction of constraints in terms of frequency, polarization, environmental conditions, geometry such as ground reflection, refraction, ducting, multipath, diffraction, interference, atmospheric attenuation in various frequency bands used in communication and radar systems.					
References	1) Collin, R.E., Antennas and Radiowave Propagation, McGraw Hill, 1988. 2) Balanis, C.A., Antenna Theory, John Wiley and Sons, New York, 2005. 3) Kraus, J.D., Antennas, McGraw Hill, 1988.					
Learning outcomes	Student, who passed the course satisfactorily will be able to: 1. Form the radiation integral for given antenna geometry, boundary conditions, and frequency range, 2. Obtain the radiated electromagnetic wave in Fraunhofer region, Conservation theorems of electromagnetic wave theory to obtain radiated electromagnetic field from various antenna structures, 3. Apply Symmetry and Duality, Uniqueness, Reciprocity, Equivalence and Power					

	4. Understand the parameters of wave propagation and identify the constraints due to environment, geometry, frequency, polarization, and medium of propagation, 5. Have the solid foundations to solve real life problems in electromagnetic wave radiation from various types of antennas and propagation in a source-free medium.

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Fundamentals of radiation theory and introduction to radiating systems
2. Week	Radiation Mechanism, Radiation Integrals and Antenna parameters
3. Week	Antenna parameters cont., Radiation from a short current filament, Radiation from a small current loop
4. Week	Radiation from an arbitrary current distribution, Field regions
5. Week	Antenna arrays, Array Factor
6. Week	Two dimensional / planar arrays, Endfire and Broadside arrays
7. Week	Midterm Exam
8. Week	Introduction to antenna pattern synthesis
9. Week	Aperture antennas, Microstrip antennas
10. Week	Receiving Antennas, Transmission and reception equivalent circuits,
11. Week	Friis Transmission Equation, Radar Range Equation
12. Week	Fundamentals of propagation, parameters of propagation
13. Week	Atmospheric Layers, Index of refraction and effective earth model, Propagation with Frequency Factor, Pattern Losses

14. Week	Atmospheric Losses, Ground Reflection, Multipath, Diffraction, Interference, System Design Examples for communication and radar
15. Week	Preparation for Final exam
16. Week	Final exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory	7	2	14
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			158
Total Workload/30 hours			5.26
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 451- Microwave Electronicss	Fall	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Elective					
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Ercument KARAPINAR, PhD					
Course objective	This course introduces and give knowledge on microwave theory. Students successfuly completing this course are expected to: Formulate voltage and current wave propagation in high frequency transmission lines. Understand the mode concept in rectangular and circular waveguides. Analyze waveguides by field theory and equivalent circuit models. Learn impedance matching techniques. Gain experience in microwave measurement techniques.					
Course Content	Plane waves. Wave Equation. Transmission lines, waveguides. Mode concept. Impedance transformation and matching techniques. Equivalent circuit analysis and scattering matrices. Microwave measurement techniques. Planar transmission lines. Passive microwave elements. Series and parallel resonant circuits. Periodic structures, k-beta diagrams. Microwave filter design, and realization. Microwave amplifier design.					
References						
Learning outcomes	Student, who passed the course satisfactorily will be able to: • Be able to carry out field, voltage and current wave analysis in transmission lines and waveguides. • Learn the techniques of impedance matching. • Carry out microwave measurements. • Understand the operation of passive microwave devices. • Recognize the operation, pass-band and stop-band characteristics of periodic structures. • Learn the field analysis and equivalent transmission line circuits of resonators. • Design basic microwave filters. • Design basic microwave amplifiers and matching circuits.					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week 1	Field analysis of transmission lines
2. Week	Basics of microwave measurements
3. Week	Impedance and scattering matrix, Wideband matching circuits
4. Week	Basics of resonators, Resonator types and their design.
5. Week	Periodic structures, k-beta diagrams
6. Week	Passive microwave elements: Power dividers, isolators, circulators.
7. Week	Midterm Exam
8. Week	Basics of filters.
9. Week	Realization of filters using transmission lines.
10. Week	Active microwave circuits and fundamental equations.
11. Week	Active microwave circuits and fundamental equations.
12. Week	Amplifier design using unconditionally stable transistors.
13. Week	Design of amplifier impedance matching circuits
14. Week	Recent applications
15. Week	Course review

16. Week	Final exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			144
Total Workload/30 hours			4.88
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 452- Satellite Communications	Fall	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Elective					
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Ercument KARAPINAR, PhD					
Course objective	• To understand the basics of satellite communications and different satellite communication orbits • Provide an in-depth understanding of satellite communication system operation, launching techniques, satellite link design and earth station technology • To explain the tools necessary for the calculation of basic parameters in a satellite communication system. • To learn speech and video coding, satellite networking and satellite personal communications, mobile satellite communications					
Course Content	Satellite configuration, sub-systems, the Space Segment Access and Utilization, satellite applications, broadcast services, mobile satellite communication, link analysis, optical satellite link transmitter, optical satellite link receiver, satellite beam acquisition, tracking & positioning, deep space optical communication link, modern development and future trends					
References						
Learning outcomes	Student, who passed the course satisfactorily will be able to: • Explain basics of satellite communication, space segment and earth segment • Understand different satellite orbits and orbital parameters • Explain and analyze link budget of satellite signal for proper communication • Understand various applications of satellite communications					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week 1	The basics of satellite communications and different satellite communication orbits
2. Week	Satellite communication system operation, launching techniques, satellite link design and earth station technology
3. Week	Satellite configuration, Transponder sub-system, Antenna sub-system,
4. Week	Control Sub-system, power sub-system, Thermal sub-system, reliability and quality Assurance.
5. Week	The Space Segment Access and Utilization
6. Week	The Space Segment Access and Utilization
7. Week	Midterm Exam
8. Week	VSAT systems: Advantages, configurations, frequency bands, elements, Applications
9. Week	Broadcast services: Television broadcast systems
10. Week	Mobile satellite communication: INMARSAT, LMSS, mobile satellite systems with non GEO satellites
11. Week	Satellite navigation systems
12. Week	Link analysis, optical satellite link transmitter, optical satellite link receiver,
13. Week	Satellite beam acquisition, tracking & positioning, deep space optical communication link
14. Week	Recent applications
15. Week	Preparation for Final exam
16. Week	Final exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			144
Total Workload/30 hours			4.88
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE SYLLABUS

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 453- CMOS VLSI Design, HDL	Fall	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Compulsory					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)						
Course objective	The course is designed to give the student an understanding of the different design steps required to carry out a complete digital VLSI (Very-Large-Scale Integration) design in silicon.					
Course Content	This is an introductory course which covers basic theories and techniques of digital VLSI design in CMOS technology. In this course, we will study the fundamental concepts and structures of designing digital VLSI systems include CMOS devices and circuits, standard CMOS fabrication processes, CMOS design rules, static and dynamic logic structures, interconnect analysis, CMOS chip layout, simulation and testing, low power techniques, design tools and methodologies, VLSI architecture.					
References	1. Weste & Harris, CMOS VLSI Design: A Circuits and Systems Perspective, 3rd ed, Addison Wesley, 2005 2. John P. Uyemura, Introduction to VLSI Circuits and Systems, John Wiley & Sons. 3. M. Morris Mano, Digital Design, 5th edition					
Learning outcomes	After taking this course students will be able to; 1. Use mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnect. 2. Create models of moderately sized CMOS circuits that realize specified digital functions. 3. Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality, timing, power, and parasitic effects. 4. Have an understanding of the characteristics of CMOS circuit construction and the comparison between different state-of-the-art CMOS technologies and processes. 5. Complete a significant VLSI design project having a set of objective criteria and design constraints.					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	Introduction to VLSI Systems
2	CMOS logic, fabrication and layout
3	MOS Transistor theory
4	Non-ideal transistor characteristics
5	Layout Design Rules
6	Circuit characterization and performance estimation
7	Midterm Exam
8	Circuit Simulation
9	Combinational and sequential circuit design
10	Combinational and sequential circuit design
11	Memory system design
12	Memory system design
13	Design methodology and tools
14	Projects Presentations
15	Recitation
16	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	
Laboratory	0	
Quiz	0	
Fieldwork	0	
Practice	0	
Homework Assessment	0	
Presentation	0	
Project	1	%30
Seminar	0	
Mid-term Exams	1	%30
Final Exam	1	%40
Total	17	%100
Contribution of semester Works to success points	16	%60
Contribution of final exam to success points	1	%40
Total	17	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload

Course Duration (x14)	14	3	42
Laboratory			
Quiz			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14
Presentation / Seminar Preparation			
Project	1	48	48
Homework assignment			
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	26	26
Total Workload			150
Total Workload/30 hours			150/30
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
1				X	
2					X
3					X
4		X			
5			X		
6		X			
7		X			
8	X				
9	X				
10	X				
11		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERİNG AND ARCHITECTURE
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE NAME

Course Name	EEE 454 – Photonics
Course Type	Elective
Code	3
ECTS	5
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members
Prequisites	None
Semestre	Fall
Course Content	Ray optics: Simple optical components, Graded index optics, Wave optics: Postulates of wave optics, monochromatic and polychromatic waves, interference, Beam optics: The Gaussian beam, Transmission through optical components, Fourier optics: Propagation of light in free-space, Optical Fourier Transform, Diffraction of light, Holography, Electromagnetic optics: Electromagnetic theory of light, monochromatic electromagnetic waves, Pulse propagation in dispersive media, Polarization and crystal optics: Polarization of light, reflection and refraction, Optics of anisotropic media, optics of liquid crystals, Polarization devices, Guided Wave optics: Planar Waveguides, Statistical optics, Photon optics, Photons in semiconductors, Electro-optics, Acousto-optics,
Learning Outcomes	After completing this course the students should be able to: 1. learn simple optical components, 2. learn graded index optics, wave optics, beam optics, Fourier optics, electromagnetic optics 3. learn electromagnetic theory of light and pulse propagation in dispersive media, 4. learn polarization of light, reflection and refraction, 5. learn photons in semiconductors, 6. learn electro-optics, acousto-optics,
References	1- Fundamentals of Photonics, 2 Volume Set, 3rd Edition, Bahaa E. A. Saleh, Malvin Carl Teich, Wiley
Learning and teaching strategies	Lecturing, discussion, report preparation and submission.
Evaluation	Take Home Exams 20%, mid-term 30%, and final exam 50%

Course Language	English

Form IIIb (English): COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Negotiation Process	EEE454	Fall	3	0	0	4	5
Prequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery (face to face,distance learning)	Face to face						
Learning and teaching strategies	Lecturing, discussion, self-study, take home exams. Laboratory activities						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	To make students understand the negotiation process and prepare them to handle this process -To teach simple optical components -To teach graded index optics, wave optics, beam optics, Fourier optics, electromagnetic optics - To teach electro-optics, acousto-optics - To prepare students for advanced photonics courses,						
Learning outcomes	After completing this course the students should be able to: 1. learn simple optical components, 2. learn graded index optics, wave optics, beam optics, Fourier optics, electromagnetic optics 3. learn electromagnetic theory of light and pulse propagation in dispersive media, 4. learn polarization of light, reflection and refraction, 5. learn photons in semiconductors, 6. learn electro-optics, acousto-optics,						
Course Content	Ray optics: Simple optical components, Graded index optics, Wave optics: Postulates of wave optics, monochromatic and polychromatic waves, interference, Beam optics: The Gaussian beam, Transmission through optical components, Fourier optics: Propagation of light in free-space, Optical Fourier Transform, Diffraction of light, Holography, Electromagnetic optics: Electromagnetic theory of light, monochromatic electromagnetic waves, Pulse propagation in dispersive media, Polarization and crystal optics: Polarization of light, reflection and refraction, Optics of anisotropic media, optics of liquid crystals, Polarization devices, Guided Wave optics: Planar						

	Waveguides, Statistical optics, Photon optics, Photons in semiconductors, Electro-optics, Acousto-optics.
Mode of Delivery	In class / Distance / Hybrid
References	1- Fundamentals of Photonics, 2 Volume Set, 3rd Edition, Bahaa E. A. Saleh, Malvin Carl Teich, Wiley

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Ray optics: Simple optical components, Graded index optics,
2. Week	Wave optics: Postulates of wave optics, monochromatic and polychromatic waves, interference,
3. Week	Beam optics: The Gaussian beam, Transmission through optical components,
4. Week	Fourier optics: Propagation of light in free-space, Optical Fourier Transform, Diffraction of light, Holography
5. Week	Electromagnetic optics: Electromagnetic theory of light, monochromatic electromagnetic waves, Pulse propagation in dispersive media,
6. Week	Polarization and crystal optics: polarization of light
7. Week	Polarization and crystal optics: reflection and refraction,
8. Week	Optics of anisotropic media,
9. Week	optics of liquid crystals,
10. Week	Polarization devices,
11. Week	Guided Wave optics: Planar Waveguides, Statistical optics,

12. Week	Photon optics, Photons in semiconductors,
13. Week	Electro-optics,
14. Week	Acousto-optics,
15. Week	Repeat
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%
Quiz	2	%10
Fieldwork	0	%0
Practice	0	%0
Take Home Exam	2	%10
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%50
Total	20	%100
Contribution of semester Works to success points	19	%60
Contribution of final exam to success points	1	%50
Total	20	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	3	42
Laboratory			
Quiz	2	6	12
Specific practical training			
Take Home Exam	2	5	10
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	25	25
Final Exam (Study duration)	1	30	30
Total Workload	20	69	119

Form VIIb (English): en

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.					X
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.				X	
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.			X		
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.			X		
5 Ability to design and conduct experiments, gather data, analyze and			X		

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually				X	
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions			X		
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in				X	

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 455- Wireless Networking Technologies and Applications	Fall	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Elective					
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Ercument KARAPINAR, PhD					
Course objective	The goal of the course is to teach the fundamental concepts about noise and link budget in wireless communication systems, propagation in wireless communication channels and statistical modelling of the channel, effect of the channel on performance, diversity and multiple access in communication systems, and also to introduce contemporary communication systems					
Course Content	-Noise and link budget analysis, - Propagation in wireless communication channels and statistical channel characterisation, - Effect of the channel on communication performance, - Diversity techniques, - Multiple Access techniques, - GSM and Wi-Fi air interface.					
References	- Molisch, Wireless Communications, 2.Ed., Wiley, 2011 - Sklar, Digital Communications: Fundamental and Applications, 2. Ed., Prentice Hall, 2001					
Learning outcomes	Student, who passed the course satisfactorily will be able to learn: • Propagation mechanisms in wireless communication channel and statistical modelling of the channel, • Effect of the wireless channel on the communication performance and ways to tackle it, • Contemporary communication systems.					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction, Gain and Loss, Basic Antenna Parameters, Thermal Noise, Noise Temperature, Noise Factor, Link Margin, Link Budget Analysis
2. Week	Gain and Loss, Basic Antenna Parameters, Thermal Noise, Noise Temperature, Noise Factor, Link Margin, Link Budget Analysis
3. Week	Electromagnetic Propagation: Reflection, Refraction, Diffraction, Scattering
4. Week	Statistical Modelling of Wireless Communication Channels: Two-path channel model, Small Scale Fading: Rayleigh channel model, Ricean Channel Model, Nakagami-m Channel Model, Fading Margin, Doppler Spectrum, Level Crossing Rate, Average Duration of F
5. Week	Statistical Modelling of Wireless Communication Channels: Large Scale Fading: Log-normal Distribution, Suzuki Model, Fading Margin
6. Week	Statistical Modelling of Wideband Channels: Inter-symbol interference, Delay spread: Two-path model, Channels with Multiple Scatterers, Frequency Selective Channels, Deterministic Time Varying Channel Modelling, WSSUS Channel Model, Tapped Delay Line
7. Week	Midterm Exam
8. Week	Standard Channel Models: Narrowband Channel Models: Deterministic and Statistical Approaches, Hata-Okumura Model, COST 231 Model, Motley-Keenan Model, Wideband Channel Models: Tapped Delay Line Model, Exponential Model, COST 207 Model
9. Week	Demodulation in Fading Channels: Adaptation of the Signal Space Representation, MAP/ML Detector, Probability of Error Calculation in Flat Fading Channels
10. Week	Diversity Techniques: Correlation Coefficient, Spatial, Temporal, Spectral and Other Diversity Techniques, Diversity with Selection, Switching, and Combining (Maximal Ratio Combiner, Equal Gain Combiner), Probability of Error Calculation with Diversi
11. Week	Multiple Access Techniques: Multiplexing and Multiple Access, Performance Comparison of FDM/A, TDM/A, FDMA and TDMA, Cellular Networks, Frequency Reuse, Cell Planning
12. Week	Fundamentals of OFDM, Transmitter-Receiver Structure, Frequency Selective Channels and Cyclic Prefix.
13. Week	GSM Systems: Air Interface, Logical and Physical Channels, Link Establishment and Handover
14. Week	Wi-Fi Systems: OFDMA based Local Networks, IEEE 802.11a/g, Packet Transmission in IEEE 802.11.
15. Week	Final exam review

16. Week	Final exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			144
Total Workload/30 hours			4.88
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 456- Digital Image Processing	Fall	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Electrive					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Assoc. Prof. Dr. Alaa ELEYAN					
Course objective	The course is designed to give students all the basic concepts of digital image processing such as including image sensing, sampling and quantization, pixel-based image processing. It will emphasis on topics such as filtering, enhancement, restoration, compression, morphology and segmentation.					
Course Content						
References	1. R. C. Gonzalez & R. E. Woods, Digital Image Processing, 3rd Edition, Prentice Hall, 2008 2. R. C. Gonzalez, R. E. Woods, & S. L. Eddins, Digital Image Processing Using MATLAB, Prentice Hall, 2004 3. J. C. Russ, The Image Processing Handbook, 3rd Edition, CRC press, 1999.					
Learning outcomes	After taking this course students will be able to; 1. Understand the fundamental components of image processing including image sensing, acquisition, sampling and quantization, pixel-based image operations. 2. Develop methodologies for image enhancement in spatial and frequency domains 3. Perform conversion from one color space to the other for different applications 4. Understand image compression techniques & the use of information theory for compression 5. Apply segmentation techniques on images.					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	Introduction to Digital Image Processing.
2	Image formation, Sensing & Acquisition, Sampling & Quantization,
3	Interpolation Techniques
4	Intensity Transformations
5	Filtering in Time Domain
6	Filtering in Time Domain
7	Midterm Exam
8	Filtering in Frequency Domain
9	Filtering in Frequency Domain
10	Color Image Processing
11	Image Restoration
12	Image Compression
13	Morphological Operations
14	Image Segmentation
15	Recitation
16	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	
Laboratory	0	
Quiz	0	
Fieldwork	0	
Practice	0	
Homework Assessment	3	%30
Presentation	0	
Project	0	
Seminar	0	
Mid-term Exams	1	%30
Final Exam	1	%40
Total	19	%100
Contribution of semester Works to success points	18	%60
Contribution of final exam to success points	1	%40
Total	19	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Quiz			
Specific practical training			

Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14
Presentation / Seminar Preparation			
Project			
Homework assignment	3	15	45
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	26	26
Total Workload			147
Total Workload/30 hours			147/30
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
1					X
2					X
3			X		
4				X	
5			X		
6		X			
7				X	
8			X		
9			X		
10		X			
11		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

ANKARA SCIENCE UNIVERSITY
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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 457- Introduction to Robotics	Fall	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Electrive					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)						
Course objective	Understand the funtademntals of robots. Solve forward and inverse robot kinematics. Calculate dynamic equation and transformation of forces between frames. Understand basics of trajectory planning.					
Course Content	Basic components of robot systems; coordinate frames, homogeneous transformations, kinematics for manipulator, inverse kinematics; manipulator dynamics, Jacobians: velocities and static forces , trajectory planning, Actuators, Sensors, Vision, Fuzzy logic control of manipulator and robotic programming.					
References	1. Saeed B. Niku, Introduction to Robotics 2e, Wiley, 2011. 2. Lung-S-Wen Tsai, Robot Analysis, John Wiley & Sons, Inc., 1999 3. K.S. Fu, R.C. Gonzalez, and C.S.G. Lee, Robotics: Control, Sensing, Vision and Intelligence, McGrawHill, 1987					
Learning outcomes	After taking this course students will be able to; 1. Describe and analyze rigid motion. 2. Write down manipulator kinematics. 3. Solve Robot kinematics and simple inverse kinematics problems. 4. Select sensors for performing robotic tasks. 5. Solve motion planning problems.					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	Fundamentals of Robotics
2	Fundamentals of Robotics
3	Robot Kinematics: Position Analysis

4	Robot Kinematics: Position Analysis
5	Robot Kinematics: Position Analysis
6	Differential Motions and Velocities
7	Midterm Exam
8	Differential Motions and Velocities
9	Dynamic Analysis and Forces
10	Dynamic Analysis and Forces
11	Dynamic Analysis and Forces
12	Trajectory Planning
13	Trajectory Planning
14	Presentations
15	Presentations
16	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	
Laboratory	0	
Quiz	0	
Fieldwork	0	
Practice	0	
Homework Assessment	0	
Presentation	0	
Project	1	%30
Seminar	0	
Mid-term Exams	1	%30
Final Exam	1	%40
Total	17	%100
Contribution of semester Works to success points	16	%60
Contribution of final exam to success points	1	%40
Total	17	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Quiz			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14

Presentation / Seminar Preparation			
Project	1	48	48
Homework assignment			
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	26	26
Total Workload			150
Total Workload/30 hours			150/30
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
1					X
2					X
3			X		
4				X	
5			X		
6		X			
7				X	
8			X		
9			X		
10		X			
11		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

Form IIIb (English): COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 458- Medical Imaging	Spring	3	0	0	3	5
Prequisites	None					
Course Language	English					
Course Type	Elective					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion, self-study, homeworks, literature search and presentation					
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members					
Course objective	To make students understand the imaging modalities: To teach students, 1) Basic image operations 2) Basic properties of radiography (requirements, image quality, clinical usage, efects and safety considirations) 3) Basic properties of MRI, NMR, ultrasound and so on.					
Learning outcomes	After taking this course students will be able to; - Know the different aspects of the medical imaging modalities - Know image reconstruction with non-diffracting sources in 2D and 3D - Understand physical principles of the medical imaging modalities - Know the basis of Magnetic Resonance Imaging (MRI), ultrasound, nuclear medicine X-ray computed tomography - Gain a broad understanding of the importance of visualization for diagnosis and therapy					
Course Content	Fundamentals and applications of medical imaging techniques: MRI, ultrasound, nuclear medicine X-ray computed tomography. Physical properties of X-Ray,					

	production and detection of X-ray. Image reconstruction techniques. Novel imaging modalities and their applications in medicine.
Mode of Delivery	In class / Distance / Hybrid
References	1- The Essential Physics of Medical Imaging, Third edition, International Edition, by Jerrold T. Bushberg, John M. Boone, Edwin M. Leidholdt Jr. and J. Anthony Seibert, Wolters Kluwer. 2- Fundamentals of medical imaging, Suetens, P. (2017), (3rd ed.). Cambridge, UK: Cambridge University Press.

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction to İmaging Modalities
2. Week	Radiology, X-ray detectors, image quality
3. Week	X- ray computed tomography
4. Week	X- ray computed tomography
5. Week	MRI
6. Week	MRI
7. Week	Midterm
8. Week	Nuclear Imaging
9. Week	Nuclear Imaging
10. Week	Ultrasound Imaging

11. Week	Ultrasound Imaging
12. Week	Medical image computing
13. Week	Medical image computing
14. Week	Novel imaging techniques and their applications
15. Week	Presentations
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	0%
Laboratory	0	0%
Quiz	4	20%
Fieldwork	0	0%
Practice	0	0%
Take Home Exam	0	0%
Presentation	1	20%
Project	0	0%
Seminar	0	0%
Homework	5	0%
Mid-term Exams	1	25%
Final Exam	1	35%
Total	26	100%
Contribution of semester Works to success points	25	65%
Contribution of final exam to success points	1	35%
Total	26	100%

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	3	42
Laboratory			
Quiz	4	4	16
Specific practical training			
Take Home Exam			
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation	1	22	22
Project			
Homework assignment	5	4	20
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	30	30
Total Workload	26	83	150

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.				x	
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.				x	
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.		X			
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.			x		
5 Ability to design and conduct experiments, gather data, analyze and			X		

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually			x		
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions			x		
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in	x				

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .				x	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE SYLLABUS

Form IIIb (English): COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 459- Biomedical Signals and Instrumentation	Fall	3	0	0	3	5
Prequisites	None					
Course Language	English					
Course Type	Elective					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion, self-study, question and answer					
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members					
Course objective	Course aims to combine medical knowledge with engineering skills and provide insight on the theoritical point of view of bioelectrical signals and measurements.					
Learning outcomes	After taking this course students will be able to; • know measurement, conditioning and processing of biological signals • design medical transducers and amplifiers • gain knowledge about the instrumentation					
Course Content	Basic concepts of biomedical signals, basic principles of medical measurement and instrumentation, sensors, biomedical transducers, the biopotentials and measurement, theory of bioelectrical signals, electrocardiography, electroencephalography, electromyography, electrodes, amplifiers for biopotential signals and instrumentation methods, electrical safety issues.					
Mode of Delivery	In class / Distance / Hybrid					
References	1- *J. G. Webster, Medical Instrumentation, 4. Ed., Wiley, 2009.* 2- *A. Terry Bahill, Bioengineering: Biomedical, Medical and Clinical Engineering, Prentice Hall, 1981.*					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Biomedical signals
2. Week	Medical measurement and instrumentation
3. Week	Sensors
4. Week	Biomedical transducers
5. Week	Electrodes
6. Week	Amplifiers for biopotentials
7. Week	Mid- term exam
8. Week	Amplifiers for biopotentials
9. Week	Amplifiers for biopotentials
10. Week	Biosignal measurements
11. Week	Biosignal measurements
12. Week	Biosignal measurements
13. Week	Blood pressure and flow measurements
14. Week	Electrical safety issues
15. Week	Repeat

16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	0%
Laboratory	0	0%
Quiz	4	20%
Fieldwork	0	0%
Practice	0	0%
Homework Assignment	10	20%
Presentation	0	0%
Project	0	0%
Seminar	0	0%
Mid-term Exams	1	25%
Final Exam	1	35%
Total	30	100%
Contribution of semester Works to success points	29	65%
Contribution of final exam to success points	1	35%
Total	30	100%

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	3	42
Laboratory			
Quiz	4	4	16
Specific practical training			
Take Home Exam			
Study Hours Out of Class (Preliminary work, reinforcement, ect)	2	5	10
Presentation / Seminar Preparation			
Project			
Homework assignment	10	3.2	32
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	25	30
Total Workload	30	60.2	150

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.					X
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.			X		
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.		X			
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.			X		
5 Ability to design and conduct experiments, gather data, analyze and					X

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually		X			
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions			X		
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself				X	
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in		X			

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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FACULTY OF ENGINEERING AND ARCHITECTURE
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

Form IIIb (English): COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 460- Fundamentals of Biomedical Engineering	Spring	3	0	0	3	5
Prequisites	None					
Course Language	English					
Course Type	Elective					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion, question – answer, presentation and report					
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members					
Course objective	To make students understand the fundamentals of the biomedical engineering: To teach students, 1) Basic problem solving techniques in Biomedical Engineering 2) Basic mechanical, operational and material properties of Biomedical Systems					
Learning outcomes	After taking this course students will be able to; - Gain knowledge about the medical device design - Know the structure and function of neural, respiratory and cardiovascular system and measurements related to these systems - Understand clinical decision-making processes depeding on medical measurements - Know the properties of biopotential amplifiers - Understand the fundamentals of biomedical engineering in order to solve problems both biology and engineering - Solve, formulate and discuss the problems related to biomedical engineering					

Course Content	The properties of biomedical instrumentation, the advantages- disadvantages and restrictions of these instruments, bioelectrical signals, active cell membrane model, biosensors, biopotential electrodes, amplifiers, biomedical signal recording systems.
Mode of Delivery	In class / Distance / Hybrid
References	*1- J. Enderle et al, Introduction to Biomedical Engineering, Academic Press, 2000.* *2- J.G. Webster, editör, Medical Instrumentation: Application and Design, Wiley, 2009.* *3- Biomedical Engineering, Health Care Systems, Technology and Techniques, Sang C. Suh, Varadraj Gurupur, Murat M. Tanik, 2011, Springer.* *4- Bioengineering Fundamentals 2nd Edition, Ann Saterbak, Ka-Yiu San, Larry McIntire, Pearson.*

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction, main principles in biomedical instrumentation, classification of biomedical devices,
2. Week	Main design criteria, development process and regulations of biomedical instruments,
3. Week	Electrical activity of excitible cells, electroneurograms, electromyograms, electrocardiogram, electroretinogram,
4. Week	Biopotential electrodes,
5. Week	Action potentials and its firing mechanism,
6. Week	Active cell model ,
7. Week	Mid- term exam
8. Week	Sensors
9. Week	Sensors

10. Week	Biopotential electrodes,
11. Week	Amplifiers,
12. Week	Amplifiers
13. Week	Biosignal recording systems
14. Week	Presentations
15. Week	Repeat
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Quiz	4	%20
Fieldwork	0	%0
Practice	0	%0
Take Home Exam	0	%8
Presentation	1	%20
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%25
Final Exam	1	%35
Total	21	%100
Contribution of semester Works to success points	20	%65
Contribution of final exam to success points	1	%35
Total	21	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	3	42
Laboratory			
Quiz	5	5	25
Specific practical training			
Take Home Exam			
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation	1	13	13
Project			
Homework assignment	5	4	20
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	25	30
Total Workload	27	70	150

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.				x	
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.					X
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.					x
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.				x	
5 Ability to design and conduct experiments, gather data, analyze and				x	

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually			x		
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions			x		
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself				x	
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in	x				

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE SYLLABUS

Form IIIb (English): COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 461- Biosignal Processing	Fall	3	0	0	3	5
Prequisites	None					
Course Language	English					
Course Type	Elective					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion, question – answer, presentation and report					
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members					
Course objective	To make students understand the fundamentals of the biosignal processing: To teach students, 1) characteristics of the biosignals 2) basic signal processing methods 3) solutions of problems related to biosignal analysis 4) analysis of different types of biosignals that could bear diagnostic information implement small-scale software for signal processing algorithms.					
Learning outcomes	After taking this course students will be able to; - Characterise biosignals - Know description and demonstration of filters - Understand the properties of linear time-invariant discrete-time systems - Know the concept of stochastic process and its use in characterising signals - Understand the fundamentals of biosignal processing - Solve, formulate and discuss the problems related to biosignal processing					
Course Content	Sampling of biosignals, discrete-time signals and systems, digital filtering, analysis in time-domain and frequency domain, event detection, characterization of the signals, spectrum analysis, fourier series and transform, the structure of FIR and IIR filters, basic design rules for FIR/IIR filters					
Mode of Delivery	In class / Distance / Hybrid					

References	1- *Biomedical Signal Analysis, Rangayyan, Rangaraj M., Wiley 2015.* 2- *Signal and Image Analysis for Biomedical and Life Sciences, Changming Sun, Tomasz Bednarz, Tuan D. Pham, Pascal Vallotton, Dadong Wang, Springer, 2015.*

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	The nature of biomedical signals, properties and difficulties
2. Week	Biomedical signal samples
3. Week	Fundamentals of filtering
4. Week	Properties and applications of various filters
5. Week	Adaptive segmentation and filters for segmentation
6. Week	Characterization of time and frequency domains
7. Week	Mid- term exam
8. Week	Fourier series
9. Week	Fourier transforms
10. Week	Discrete Fourier Transform
11. Week	Fast Fourier Transform (FFT)
12. Week	Digital Filters - FIR, IIR

13. Week	Problem solving with with case studies
14. Week	Presentations
15. Week	Repeat
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Quiz	4	%20
Fieldwork	0	%0
Practice	0	%0
Take Home Exam	0	%8
Presentation	1	%20
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%25
Final Exam	1	%35
Total	21	%100
Contribution of semester Works to success points	20	%65
Contribution of final exam to success points	1	%35
Total	21	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	3	42
Laboratory			
Quiz	4	5	20
Specific practical training			
Take Home Exam			
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation	1	13	13
Project			
Homework assignment	5	5	25
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	25	30
Total	26	71	150

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.					X
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.					X
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.					X
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.					X
5 Ability to design and conduct experiments, gather data, analyze and					X

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually				X	
7 Ability to communicate effectively in English, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions			X		
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice		X			
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in	X				

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 462-Embedded Systems Design	Fall	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Electrive					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)						
Course objective	This hands-on course introduces embedded systems and the embedded development/programming/debugging techniques. Through a series of exercises, students acquire skills in developing/programming/debug embedded Linux systems.					
Course Content	Anatomy of an Embedded System. Why embedded Linux? Processor Basics. Linux Basics. RS232. Terminal Emulators. Cross-development Environment (Native/Target compilation). Bootloaders. Setting up Network Services. Booting the Kernel (SD-Card or NFS/TFTP). Configuring/Building linux kernel and root file system. Framebuffer, touchscreen device. Embedded Graphics, Embedded Graphics Frameworks, Qt/Qt Embedded, Virtual Framebuffer. GPIO, sysfs. Gstreamer, Gstreamer pipes, Gstreamer TI Plug-in. Loading/Unloading Device Drivers. Setting up web server. Setting up Wi-Fi module. Unofficial laboratory exercises, one Term Project.					
References	1. Karım Yaghmour, “Building Embedded Linux Systems,” O’reilly 2. Chrıstopher Hallınan, “Embedded Linux Primer,” prentice hall open source software development series.					
Learning outcomes	After taking this course students will be able to; 1. Show adequate knowledge in microprocessor architectures, embedded Linux, embedded graphics (Qt). 2. Write Qt/Qt Embedded GUI applications, network applications, digital multimedia applications. 3. Debug, verify, emulate embedded Linux systems. 4. Devise, select, and use modern techniques and tools needed for embedded Linux systems. 5. work in a team.					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	Embedded or not? Anatomy of an embedded system. Why linux? Processor basics. Linux basics.
2	RS232. Terminal emulators.
3	Cross-development environment, native/target compilation, toolchains, gdb, gdbserver, Tİ dvsdk.
4	Bios versus bootloaders, u-boot.
5	Setting up network services. Booting the kernel (sd-card or nfs/tftp).
6	Configuring/building linux kernel and root file system.
7	Midterm Exam
8	Setting up wi-fi module. Loading/unloading device drivers. Device driver basics.
9	GPİO, SYSFS, file systems, framebuffer, touchscreen device.
10	Embedded graphics, windowing environment, Qt/Qt embedded, virtual framebuffer, embedded gui application development.
11	Setting up web server.
12	Digital multimedia applications, gstreamer/gstreamer pipes, gstreamer Tİ plugin.
13	Project Presentations
14	Project Presentations
15	Recitation
16	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	
Laboratory	0	
Quiz	0	
Fieldwork	0	
Practice	0	
Homework Assessment	0	
Presentation	0	
Project	1	%30
Seminar	0	
Mid-term Exams	1	%30
Final Exam	1	%40
Total	17	%100
Contribution of semester Works to success points	16	%60
Contribution of final exam to success points	1	%40
Total	17	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Quiz			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14
Presentation / Seminar Preparation			
Project	1	48	48
Homework assignment			
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	26	26
Total Workload			150
Total Workload/30 hours			150/30
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1		X			
2					X
3					X
4					X
5					X
6					X
7	X				
8	X				
9	X				
10	X				
11	X	UNGRADE			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE SYLLABUS

Form IIIb (English): COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 463- Computational Neuroscience	Fall	3	0	0	3	5
Prequisites	None					
Course Language	English					
Course Type	Elective					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion, self-study, question-answer, project preperation					
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members					
Course objective	The course will equip students to understand how synapses and neurons work, how the membrane potential give response to synaptic input, how the action potential occur and interaction with the various ionic currents. Students will describe the learning and plasticity of neuronal circuits.					
Learning outcomes	After taking this course students will be able to; • know neural coding, biophysics of neurons, and neural networks • understand dynamical variables of the neural systems • know membrane equations • characterize neural dynamical system • compare electronic and neuronal circuits					
Course Content	Introduction to computational neuroscience, molecular biology of the neuron synaptic transmission and neural encoding , neural decoding , ionic channels , information theory , the neural networks models, neuroelectronics, synaptic plasticity and learning, conditioning and reinforcement learning, representational learning					
Mode of Delivery	In class / Distance / Hybrid					
References	1- *Dayan, Peter, and L. F. Abbott.Theoretical Neuroscience: Computational and Mathematical Modeling of Neural Systems. Cambridge, MA: MIT Press, 2005.* 2- *Eric R. Kandel, James H. Schwartz, Thomas M. Jessell, Steven A. Siegelbaum, A. J. Hudspeth, McGraw-Hill Professional, 2013.*					

	3- *Christof Koch, Computational Neuroscience, Oxford University Press, USA, 2004.*

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction to Computational Neuroscience, Molecular Biology of the Neuron
2. Week	Synaptic Transmission and Neural Encoding
3. Week	Neural Decoding
4. Week	Ionic channels
5. Week	Information Theory
6. Week	Neuroelectronics
7. Week	Mid- term exam
8. Week	Neuroelectronics
9. Week	Conductances and Morphology
10. Week	Network Models
11. Week	Network Models
12. Week	Synaptic Plasticity and Learning
13. Week	Conditioning and Reinforcement Learning

14. Week	Representational Learning
15. Week	Project presentations
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	0%
Laboratory	0	0%
Quiz	4	20%
Fieldwork	0	0%
Practice	0	0%
Take Home Exam	0	0%
Presentation	1	10%
Project	1	10%
Seminar	0	0%
Mid-term Exams	1	25%
Final Exam	1	35%
Total	26	100%
Contribution of semester Works to success points	25	65%
Contribution of final exam to success points	1	35%
Total	26	100%

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	3	42
Laboratory			
Quiz	4	4	16
Specific practical training			
Take Home Exam			
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation	1	10	10
Project	1	12	12
Homework assignment	5	4	20
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	30	30
Total Workload	26	83	150

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.				X	
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.				X	
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.		X			
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.		X			
5 Ability to design and conduct experiments, gather data, analyze and			X		

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually				X	
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions			X		
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in		X			

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .			X		

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 464 - Electronic Systems of UAV	Fall	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Elective					
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Ercument KARAPINAR, PhD					
Course objective	Upon the completion of this course, students will be able to: • have knowledge of electronics and information technologies for unmanned aerial systems. • understand the capabilities and limitations of the UAVs and data post-processing systems; • understand fundamental concepts surrounding operating a UAV such as: • understand rules and regulations governing operating a UAVs					
Course Content	Parts of UAV systems, design methods, navigation systems, subsystems, airodyamics, flight dymanmic, usage of UAVs.					
References	Various resources.					
Learning outcomes	Student, who passed the course satisfactorily will be able to: • possess all required concepts and skills related to the remote control of unmanned aerial systems; • apply the learnt concepts and skills to maintain and perform diagnosis on existing unmanned aerial systems; • extend their knowledge to analyze and develop new modules and components in unmanned aerial systems for desired needs. • Understand the mapping standards and how it apply					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction to Aircraft Design and flight
2. Week	Types and comparison of wing, tail, fuselage, landing gear, wing-tail combinations, power plant
3. Week	Dynamics of Aerial Systems
4. Week	Estimation Methodologies: Lift and drag coefficient, design loads, component mass breakdown, acquisition cost, direct operating cost.
5. Week	Operational and Environmental Issues: Range-payload diagram, V-n diagram, noise and emission levels,
6. Week	Radio navigation systems
7. Week	Midterm Exam
8. Week	Stability and to autopilot knowledge
9. Week	Electronics Hardware and Radio Frequency Links
10. Week	Practical antennae and transmission lines; User interfaces electronics for Ground Control Station GCS
11. Week	Brushless motors and the associated Electronic Speed Controllers ESC;
12. Week	Servo motors and associated interfacing; Issues of electromagnetic interference; Power converters and charging circuits.
13. Week	GSM Systems: Air Interface, Logical and Physical Channels, Link Establishment and Handover
14. Week	Embedded Controllers
15. Week	Final exam review
16. Week	Final exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			144
Total Workload/30 hours			4.88
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 465- Electronic Defense Systems	Fall	3	0	0	3	5

Prerequisites	None
Course Language	English
Course Type	Technical Elective
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid
Learning and teaching strategies	Lecturing, discussion and submission.
Instructor (s)	Ercument KARAPINAR, PhD
Course objective	Upon the completion of this course, will be aim a technical introduction to electronic warfare. Various electronic warfare concepts will be introduced in order to facilitate the student with a systems standing of electronic warfare techniques and systems.
Course Content	Introduction to Electronic Warfare. Electronic Warfare Threat Technology. Fundamantals of Radar Threats, Fundamentals of EO/IR Threats, Electronic Support Systems. Electronic Attack Systems and Techniques, Electronic Protection Approaches.
References	1) L.B.Van Brunt, Applied ECM, Vol. 1,2,3, 1978, 1982, 1995. 2) M.I.Skolnik, Introduction to Radar Systems, 2.Ed, 1980. 3) M.V.Maksimov, Radar Anti-Jamming Techniques, Artech House, 1980. 4) D.C.Schleher, Introduction to Electronic Warfare, Artech House, 1986. 5) A.Golden, Radar Electronic Warfare, AIAA, 1987.
Learning outcomes	Student, who passed the course satisfactorily will be able to: • Formulate system level problems encountered in electronic warfare area in terms of mathematical models • Analyse the functioning and interrelations of subsytems in an electronic warfare system • Develope technical architecture of electronic warfare systems in preliminary system design level • Develope basic simulation and analysis tools for the assesment of a given electronic warfare scenario • Apply simulation tools for the analysis of electronic warfare techniques.

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction to Electronic Warfare
2. Week	EW Threat Technologies
3. Week	Radar Fundamentals
4. Week	Search Radars
5. Week	Tracking Radars
6. Week	Radar Guided Missiles
7. Week	Midterm Examination
8. Week	EO/IR Fundamentals
9. Week	ESM Systems
10. Week	ECM Systems
11. Week	ECM Techniques against Search Radars
12. Week	ECM Techniques against Track Radars
13. Week	ECCM Techniques
14. Week	ECCM Techniques
15. Week	Course review

16. Week	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			144
Total Workload/30 hours			4.88
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

Course Description Form	
Course Code and Name	EEE 466 Control Systems II
Course Semester	7-8
Catalog Content	Frequency domain analysis, Bode and Nyquist stability analysis, state-space form, similarity transformations, controllability of systems, observability of systems, system design with pole placement
Textbook	1) Katsuhiko Ogata, “Modern Control Engineering”, transl: Palme Publishing, 2018
Supplementary Textbooks	2) D’Azzo, Houpis, Linear Control Systems: Analysis and Design, , 4. Ed., McGraw-Hill 3) Richard C. Dorf, Robert H. Bishop “Modern Control Systems”, Prentice Hall, 4) Franklin Powell, Emami-Naeini, Feedback Control of Dynamical Systems, 4. Ed., Addison Wesley
Credit	3
Prerequisites of the Course (*Attendance Requirements*)	There is no prerequisite or co-requisite for this course.
Type of the Course	Technical elective
Instruction Language	English
Course Objectives	By analyzing the systems in the frequency domain, to ensure the controllability and observability of the examined system. Servo system design using polar assignment method.
Course Learning Outcomes	1) In this course, the students analyze the system in the frequency domain. 2) After taking this course, The student makes system design in the frequency domain. 3) This course supplies students with test the controllability and observability 4) In this course, the student knows the Lyapunov's methods
Instruction Methods	The mode of delivery of this course is Face to face
Weekly Schedule	1. Frequency domain analysis, asymptotic approximation method in Bode analysis 2. Real approach method in Bode analysis, angle limit, gain limit, stability criterion 3. Drawing of Nyquist diagrams and Nyquist stability criterion 4. Control system design with frequency response approach 5. Phase lead, phase lag compensator 6. State Space Form, eigenvalues and eigenvectors 7. Solution of time independent state equations 8. Similarity Transformations, midterm exam 9. Controllability and Observability of the systems 10. Pole placement 11. Servo system design 12. State observers 13. Design of control systems with observers

Teaching and Learning Methods *(These are examples. Please fill which activities you use in the course)*	Weekly lecture hours Reading Activities Internet browsing, library work Material design, application Report preparing Midterm and midterm exam preparation Final exam and preparation for final exam

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment	1	10
Application		
Projects	1	10
Practice		
Quiz		
Percent of In-term Studies (%)		60
Percentage of Final Exam to Total Score (%)		40

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	3	42
Weekly Tutorial Hours			
Reading Tasks	7	2	14
Studies	7	1	7
Material Design and Implementation	7	2	14
Report Preparing	7	1	7
Preparing a Presentation			
Presentations			
Midterm Exam and Preparation for Midterm Exam	4	3	12
Final Exam and Preparation for Final Exam	4	3	12
Searching in Internet and Library			
Total Workload			108
Total Workload / 25			4,32
Course Credit (ECTS)			4

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	Adequate knowledge in mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.			x		
2	An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this			x		
3	An ability to design a complex system, process, device, or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.			x		
4	Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems encountered in engineering applications; ability to use information technologies effectively.			x		
5	Ability to design, conduct experiments, collect data, analyze and interpret results for the study of complex engineering problems or discipline-specific research topics.			x		
6	Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.			x		
7	Ability to communicate effectively in oral and written Turkish; knowledge of at least one foreign language; Ability to write effective reports and understand		x			
8	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		x			
9	To act in accordance with ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		x			

		10	Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.	x				
		11	Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering		x			
The Course's Lecturer(s) and Contact Information	Prof. DR. İsmail COŞKUN, ismail.coskun@ankarabilim.edu.tr							

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COURSE SYLLABUS

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 467- System Modeling and Simulation	Fall	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Elective					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)						
Course objective	This course aims to teach students the basic system concept and definitions of system, techniques to model and to simulate various systems, to analyze a system and to make use of the information to improve the performance.					
Course Content	Basic concepts in discrete event simulation (DES), classification of simulation models, design of discrete-Event Simulation (DES), random number generation, Input data modeling, verification and validation of simulation models, output data analysis, introduction to parallel and distributed simulation and introduction to design of experiments					
References	1. Larry H Leemis, Stephen K. Park, Discrete-Event Simulation, A First Course. published by Prentice Hall 2006 2. Zeigler, BP, Praehofer, H, Kim, TG, Theory of Modeling and Simulation: Integrating Discrete Event and Continuous Complex Dynamic Systems, Academic Press, 2000 3. Altiok, T, Melamed, B, Simulation Modeling and Analysis with Arena, Academic Press, 2007 4. Averill M. Law, W. David Kelton, Simulation Modeling and Analysis (3rd Edition). McGraw-Hill 2000					
Learning outcomes	After taking this course students will be able to; 1. Define basic concepts in modeling and simulation (M&S). 2. Classify various simulation models and give practical examples for each category. 3. Construct a model for a given set of data and motivate its validity. 4. Generate and test random number variates and apply them to develop simulation models. 5. Analyze output data produced by a model and test validity of the model. 6. Explain parallel and distributed simulation methods.					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	Basic concepts in discrete event simulation (DES)
2	Classification of simulation models
3	Design of discrete-event simulation (DES)
4	Basic static and dynamic system modeling techniques
5	Random number generation
6	Input data modeling
7	Midterm Exam
8	Verification and validation of simulation models
9	Verification and validation of simulation models
10	Output data analysis
11	Introduction to parallel and distributed simulation
12	Introduction to design of experiments
13	Applications of Discrete Event Simulation
14	Projects Presentations
15	Recitation
16	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	
Laboratory	0	
Quiz	0	
Fieldwork	0	
Practice	0	
Homework Assessment	0	
Presentation	0	
Project	1	%30
Seminar	0	
Mid-term Exams	1	%30
Final Exam	1	%40
Total	17	%100
Contribution of semester Works to success points	16	%60
Contribution of final exam to success points	1	%40
Total	17	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload

Course Duration (x14)	14	3	42
Laboratory			
Quiz			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14
Presentation / Seminar Preparation			
Project	1	48	48
Homework assignment			
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	26	26
Total Workload			150
Total Workload/30 hours			150/30
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
1				X	
2					X
3					X
4		X			
5			X		
6		X			
7		X			
8	X				
9	X				
10	X				
11		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 468- Numerical Methods in EE	Fall	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Elective					
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Ercument KARAPINAR, PhD					
Course objective	It is aimed that the students who complete the course have an understanding of the techniques available for solving numerical computation problems that arise most often in electrical and electronics engineering. It is aimed that the students be aware of the relevant issues in selecting appropriate methods and software and use them wisely.					
Course Content	Approximations and error in numerical methods, Systems of linear equations, Linear least squares, Eigenvalue problems, Nonlinear equations, Optimization, Interpolation, Numerical integration and differentiation, Differential equations, Random number generation.					
References	Heath, Scientific Computing, 2002					
Learning outcomes	Student, who passed the course satisfactorily will be able to: • Recognize, classify and formulize numerical methods • Understand the main error concepts at the input and output and can relate them • Interpret the results of the numerical techniques that they use • Decide which algorithm to use when encountered with a numerical problem • Know the advantages and disadvantages of the numerical algorithm they use, and have a realistic estimation of how the algorithm will operate					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Numerical error, sensitivity, floating point arithmetics
2. Week	Systems of linear equations
3. Week	Linear least squares
4. Week	Eigenvalue problems
5. Week	Computing eigenvalues and eigenvectors
6. Week	Nonlinear equations
7. Week	Optimization problems, one-dimensional optimization
8. Week	Multi-dimensional optimization
9. Week	Interpolation
10. Week	Numerical integration and differentiation
11. Week	Differential equations, initial value problems
12. Week	Differential equations, boundary value problems
13. Week	Partial differential equations
14. Week	Random number generation
15. Week	Course review

16. Week	Final exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			144
Total Workload/30 hours			4.88
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 469- Coding Theory	Fall	3	0	0	3	5

Prerequisites	None
Course Language	English
Course Type	Technical Elective
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid
Learning and teaching strategies	Lecturing, discussion and submission.
Instructor (s)	Ercument KARAPINAR, PhD
Course objective	The objective of the course is to introduce the notion of channel coding, conventional and modern channel codes, fundamentals of graph theory and codes on graphs
Course Content	• Linear block codes, • Convolutional codes • Concatenated codes • Elements of graph theory • Algorithms on graphs • Turbo decoding • Low density parity check codes
References	Wicker and Kim, Fundamentals of codes, graphs, and iterative decoding, 2003. Lin and Costello, Error control coding, second ed. 2004. Richardson and Urbanke, Modern coding theory, 2008.
Learning outcomes	Student, who passed the course satisfactorily will be able to: • Learn and use the main algebraic tools utilized in coding theory • Learn coding and decoding methods for fundamental block and convolutional codes • Learn analysis tools for fundamental block and convolutional codes • Learn message passing algorithms defined on graphs • Learn codes on graphs, coding and iterative decoding methods for codes on graphs

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Source and channel coding basics, complexity, bounds
2. Week	Algebra review
3. Week	Polynomials over Galois fields
4. Week	Linear block codes structure, Hamming codes
5. Week	BCH codes
6. Week	Reed-Solomon codes
7. Week	Convolutional codes
8. Week	Midterm Exam
9. Week	Concatenated codes
10. Week	Elements of graph theory
11. Week	Algorithms on graphs
12. Week	Turbo decoding
13. Week	Low-density parity check codes
14. Week	Project presentations
15. Week	Couser review
16. Week	Final exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			144
Total Workload/30 hours			4.88
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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COURSE INFORMATION

Course Name	**Semester**	**Theory (hours/week)**	**Application (hours/week)**	**Laboratory (hours/week)**	**National Credit**	**ECTS**
EEE 470- Information Theory	Fall	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Elective					
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Ercument KARAPINAR, PhD					
Course objective	The objective of the course is to introduce the notion of entropy and information, the fundamental limits of data compression, the fundamental limits of data transmission systems.					
Course Content	• Introduction, review of probability, • Entropy, relative entropy, mutual information, inequalities, • The asymptotic equipartition property, • Data compression, • Channel capacity, • Differential entropy, the Gaussian channel, • Network information theory.					
References	Elements of Information Theory, Cover and Thomas, Wiley Interscience Gallager, "Claude E. Shannon: A Retrospective on His Life, Work, and Impact", IEEE Trans. Inform. Theory, vol.47, no.7, Nov. 2001 Wyner, "Fundamental Limits in Information Theory", Proc. of the IEEE, vol.69, no.2, Feb. 1981					
Learning outcomes	Student, who passed the course satisfactorily will be able to: • Learn and use the main mathematical tools of information theory that quantify and relate information • Learn fundamental limits for systems that store and compress data • Learn fundamental methods of source coding • Learn fundamental limits for systems that communicate data • Utilize information theory in order to gain insight of and design any system that stores, processes, or communicates information					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Review of probability theory, entropy
2. Week	Relative entropy and mutual information
3. Week	Jensen’s inequality and its consequences
4. Week	Asymptotic equipartition property
5. Week	Data compression and Kraft inequality
6. Week	Optimal codes, Huffman codes
7. Week	Midterm Exam
8. Week	Shannon-Fano-Elias coding
9. Week	Channel capacity examples
10. Week	Channel coding theorem
11. Week	Fano?s inequality and the converse to the coding theorem
12. Week	Differential entropy
13. Week	Gaussian channel
14. Week	Network information theory
15. Week	Course review

16. Week	Final exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			144
Total Workload/30 hours			4.88
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

Course Description Form	
Course Code and Name	EEE 471 High Voltage Techniques
Course Semester	7
Catalog Content	High Voltage Technique course includes the properties and classification of high voltage, calculation of reflection and refraction voltages in transmission lines, and examination of high voltage protection equipment.
Textbook	1. High Voltage Technique 1- 2, Muzaffer Ozkaya, 1996.
Supplementary Textbooks	2. High Voltage Engineering Fundamentals, E. Kuffel, W.S. Zaengl, J. Kuffel, 2000. 3. High Voltage Engineering, C.L._Wadhwa, 2000. 4. Transients in Power Systems, Lou Van de Sluis, 2001.
Credit	4
Prerequisites of the Course (*Attendance Requirements*)	There is no prerequisite or co-requisite for this course.
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Teaching over voltages, moving waves, protection against over voltage and insulation coordination.
Course Learning Outcomes	1) Students know the basic concepts of high voltage 2) Students know internal and external overvoltage 3) Students know the waves traveling in transmission lines 4) Students know simple and abnormal switching transient 5) Students know Protection Against Over-Voltage, Selection of Surge Arresters 6) Students know Insulation Coordination.
Instruction Methods	The mode of delivery of this course is Face to face
Weekly Schedule	1. Basic concepts and transmission lines-state operation 2. Internal overvoltages 3. Internal overvoltages 4. Transmission lines-transient operation, external overvoltages 5. External overvoltages 6. Traveling waves 7. Traveling waves 8. Mid term, simple switching transient 9. Simple switching transient 10. Abnormal switching transient 11. Abnormal switcing transient 12. Measurement of high voltages 13. Protection against over-voltage, surge arresters, ınstallation of surge arrester, selection of surge arresters 14. Insulation coordination

Teaching and Learning Methods *(These are examples. Please fill which activities you use in the course)*	Weekly lecture hours Reading Activities Internet browsing, library work Midterm and midterm exam preparation Final exam and preparation for final exam

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	60
Assignment		
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		60
Percentage of Final Exam to Total Score (%)		40

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	3	42
Weekly Tutorial Hours			
Reading Tasks	10	1	10
Studies	6	1	6
Material Design and Implementation			
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preparation for Midterm Exam	3	3	9
Final Exam and Preparation for Final Exam	3	7	21
Searching in Internet and Library			
Total Workload			88
Total Workload / 25			3,52
Course Credit (ECTS)			4

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	Adequate knowledge in mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.		x			
2	An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this		x			
3	An ability to design a complex system, process, device, or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.			x		
4	Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems encountered in engineering applications; ability to use information technologies effectively.		x			
5	Ability to design, conduct experiments, collect data, analyze and interpret results for the study of complex engineering problems or discipline-specific research topics.		x			
6	Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.			x		
7	Ability to communicate effectively in oral and written Turkish; knowledge of at least one foreign language; Ability to write effective reports and understand			x		
8	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		x			
9	To act in accordance with ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		x			

		10	Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.	x					
		11	Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering	x					
The Course's Lecturer(s) and Contact Information	Prof.Dr. İsmail COŞKUN, ismail.coskun@ankarabilim.edu.tr								

Course Description Form	
Course Code and Name	EEE 472 Power System Analysis
Course Semester	7, 8
Catalog Content	Modeling of power systems, matrix analysis and solution methods, power flow, symmetrical components theory, short circuit analysis.
Textbook	1. Arifoğlu U., Güç Sistemlerinin Bilgisayar Destekli Analizi 2. ÇAKIR H., Elektrik Güç sistemleri Analizi
Supplementary Textbooks	3. John J. Grainger, William D. Stevenson, Power System Analysis 4. Thomas J. Overbye, J. Duncan Glover, Mulukutla S. Sarma, Güç Sistemlerinin analizi ve Tasarımı
Credit	4
Prerequisites of the Course (Attendance Requirements)	There is no prerequisite or co-requisite for this course. There is an obligation to attend classes.
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	The aim of this course is to provide the students with a basic knowledge of electrical power systems components and to design power systems using these information to solve problems and analyze system components.
Course Learning Outcomes	1. Model energy transmission and distribution lines, 2. Make modeling and analysis of other elements in the power system 3. Perform short circuit analysis on balanced and unbalanced power systems.
Instruction Methods	This course will only face-to-face training
Weekly Schedule	1. Week: Basic concepts and elements of power systems 2. Week: Modeling of energy transmission lines 3. Week: Electric equivalent circuit models and phasor diagrams 4. Week: Classical and matrix analysis solution methods 5. Week: Power flow, Natural power, Maximum power 6. Week: Generator, transformer and load modeling 7. Week: Bara Admittance and Impedance Matrices 8. Week: Impedance and reactance diagrams, Mid-term exam 9. Week: Symmetrical Components Theory 10. Week: Solutions with symmetrical components 11. Week: Faults in Power Systems 12. Week: Symmetrical Faults in Power Systems 13. Week: Asymmetrical Faults in Power Systems 14. Week: Use of the Bara Impedance Matrix in Analysis of Asymmetric Arrangements

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours
Internet browsing, library work
Preparation of Midterm and Midterm Exam
Final Exam and Preparation for Final Exam

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	40
Assignment		
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)	1	60
Percentage of Final Exam to Total Score (%)	1	60
Attendance		

Workload

Activity	**Total Number of Weeks**	**Duration (weekly hour)**	**Total Period Work Load**
Weekly Theoretical Course Hours	14	3	42
Weekly Tutorial Hours			
Reading Tasks			
Studies	10	2	20
Material Design and Implementation			
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preparation for Midterm Exam	2	10	20
Final Exam and Prepration for Final Exam	2	10	20
Other (should be emphasized)			
Total Workload			102
Total Workload / 25			4,08
Course Credit (ECTS)			4

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	Adequate knowledge in mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.			X		
2	An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.			X		
3	An ability to design a complex system, process, device, or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.			X		
4	Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems encountered in engineering applications; ability to use information			X		

		technologies effectively.					
	5	An ability to design, conduct experiments, collect data, analyze and interpret results to investigate engineering problems or discipline-specific research topics.			X		
	6	Ability to work effectively in disciplinary teams		X			
	7	Ability to work effectively in interdisciplinary teams.		X			
	8	Ability to communicate effectively in oral and written Turkish; knowledge of at least one foreign language.		X			
	9	Ability to write effective reports and to understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instruction and receiving skills.		X			
	10	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.			X		
	11	To act in accordance with ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.			X		
The Course's Lecturer(s) and Contact Information	Prof.Dr. İsmail COŞKUN, ismail.coskun@ankarabilim.edu.tr						

Course Description Form	
Course Code and Name	EEE 473 Distribution Systems
Course Semester	7
Catalog Content	Current status of electricity consumption in Turkey, the number of transformers in the distribution system, their voltage level and line lengths, conductors used in transmission lines, electrical line constants, voltage drop in DC, 1-phase AC, 3-phase AC and medium voltage systems, energy loss and cross-section calculations, tree and ring grid structures, lines supplied from multiple points with equal or different voltages, short circuit calculations and circuit breaker selection, compensation in medium voltage grids, line optimization, solar system calculations
Textbook	1. Prof. Dr. Erdal Irmak, "Energy Distribution Lecture Notes", http://www.websitem.gazi.edu.tr/erdal
Supplementary Textbooks	2. İsmail Kaşıkçı, "Elektrik Tesislerinde Kısa Devre Hesapları ve Uygulamaları IEC 60 909", Birsen Yayınevi,2007. 3. "Türkiye Elektrik Enerjisi 10 Yıllık Üretim Kapasite Projeksiyonu Raporu", Online Kaynak (www.epdk.org.tr). 4. Prof. Dr. Nariman Şerifoğlu, "Elektrik Enerji Sistemleri Cilt 1: Sürekli Çalışma Durumları", Papatya Yayıncılık, 2003. 5. Yetkin Saner, "Güç Dağıtımı", BirsenYayınevi 6. Doç. Dr. Fahri Okan Pekiner, "Enerji Dağıtımı Ders Notları", http://www.yarbis.yildiz.edu.tr/pekiner 7. Doç. Dr. Bora Alboyacı, "Enerji Dağıtımı Ders Notları", http://akademikpersonel.kocaeli.edu.tr/alboyaci/ 8. Ali Keyhani, "Yenilenebilir Enerji Sistemlerinde Akıllı Şebeke Tasarımı", Wiley-IEEE Press, Türkçe Çeviri: TMMOB Elektrik Mühendisleri Odası, Çeviren: Korhan Gerçek, Aydın Bodur, 1. Baskı, 2013.
Credit	4
Prerequisites of the Course (Attendance Requirements)	There is no prerequisite or co-requisite for this course.
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	Determination of optimal cross-section calculation according to voltage drop and power loss in low voltage and medium voltage distribution grids and determination of optimum grid design, ensuring voltage stability and angular stability in distribution grids
Course Learning Outcomes	1. Having the professional knowledge and the ethical responsibility on power distribution 2. Having the knowledge for the safe and economical operation of distribution grids 3. Having the ability and knowledge of distribution grid protection 4. Ability to calculate conductor cross-section, voltage drop and short circuit in distribution grids 5. Having the knowledge about power factor correction 6. Ability to make connection calculations of solar energy systems connected to distribution network
Instruction Methods	The mode of delivery of this course is Face to face
Weekly Schedule	Week 1: Basic Definitions (Terminology), Standards and Regulations, Number of Transformers and Line Lengths in Distribution System Week 2: Standard Voltages, Conductors, Electrical Grid Parameters, Electrical Power, Voltage Drop on DC Grid Week 3: Voltage Drop and Power Loss on 1-Phase AC Networks, Problem Solutions Week 4: Voltage Drop and Power Loss on 3-Phase AC Networks, Problem Solutions Week 5: Voltage Drop on Inductive Loaded Distribution Grids, Voltage Drop on Capacitive Loaded Distribution Grids, Problem Solutions Week 6: Cross Section Calculations in DC Networks and 1-Phase AC Networks, Problem Solutions Week 7: Cross Section Calculations in 3-Phase AC Networks and Medium Voltage Grids, Problem Solutions

Week 8: Midterm Exam, Cross Section and Voltage Drop Calculations in Tree Networks and Mesh Networks
Week 9: Grids Supplied From Multipoint under Equal Voltages, Grids Supplied From Multipoint under Different Voltages, Ring Networks, Problem Solutions
Week 10: Short Circuit Calculations, Reasons and Effects of Short Circuits, Short Circuit Types
Week 11: Calculation of Initial and Symmetrical Short Circuit Current, Determination of Circuit Breaker, Problem Solutions
Week 12: Compensation in Distribution Grids, Consumer-Side Compensation Calculations, Grid Compensation Calculations, Problem Solutions
Week 13: Line Optimization
Week 14: Design and Connection Calculations of Solar Energy Systems Connected to Distribution Network

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours
Reading activities
Internet and library research
Report preparation
Preparing a presentation
Presentations
Midterm examand preparation for midterm exam
Final exam and preparation for final exam

Assessment Criteria

	Numbers	Total Weighting (%)
Midterm Exams	1	35
Assignment	1	10
Application		
Projects		
Practice		
Quiz	1	15
Percentage of In-term Studies to Total Score (%)		60
Percentage of Final Exam to Total Score (%)		40
Attendance		15

Workload

Activity	Total Number of Weeks	Duration(weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	3	42
Weekly Tutorial Hours			
Reading Tasks	14	1	14
Studies	14	1	14
Material Design and Implementation			
Report Preparing	1	5	5
Preparing a Presentation	1	3	3
Presentations	1	2	2
Midterm Exam and Preparation for Midterm Exam	1	10	10
Final Exam and Preparation for Final Exam	1	10	10
Other (should be emphasized)			
Total Workload			100
Total Workload / 25			4
Course Credit (ECTS)			4

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	Adequate knowledge in mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
2	An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and				X	

		modeling methods for this purpose.					
	3	An ability to design a complex system, process, device, or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.			X		
	4	Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems encountered in engineering applications; ability to use information technologies effectively.			X		
	5	Ability to design, conduct experiments, collect data, analyze and interpret results for the study of complex engineering problems or discipline-specific research topics.			X		
	6	Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
	7	Ability to communicate effectively in oral and written Turkish; knowledge of at least one foreign language; Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instruction and receiving skills.			X		
	8	Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
	9	To act in accordance with ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.			X		
	10	Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.			X		
	11	Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.		X			

The Course's Lecturer(s) and Contact Information	Prof.Dr. İsmail COŞKUN, ismail.coskun@ankarabilim.edu.tr

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERİNG AND ARCHITECTURE
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE NAME

Course Name	EEE 474 – Audio Engineering and Acoustics
Course Type	Elective
Code	3
ECTS	5
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members
Prequisites	None
Semestre	Fall
Course Content	Principles of audio electronics and the decibel scale; electromagnetic induction; power, ground, and amplifiers; core concepts in digital audio; console and DAW signal flow, routing, and gain staging; microphone and loudspeaker principles and applications; signal processing, including compression and equalization, Sound and Image relation, Noise, Programming for Sound: Synthesis, Acoustic, Vibration and Waves, Acoustic Wave Equation and its Basic Physical Measures, reverberation period and its design application
Learning Outcomes	After taking this course students will be able to; Know audio electronics. Know signal processing, including compression and equalization Understand Noise. Understand Acoustic Wave Equation
References	1- Glen Ballou (ed.) — Handbook for Sound Engineers, 5th Ed, 2015 2- Sound Reproduction: The Acoustics and Psychoacoustics of Loudspeakers and Rooms, Floyd E. Toole, 2017
Learning and teaching strategies	Lecturing, discussion, report preparation and submission.
Evaluation	Take Home Exams 20%, mid-term 30%, and final exam 50%
Course Language	English

Form IIIb (English): COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Negotiation Process	EEE474	Fall	3	0	0	3	5
Prequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery (face to face,distance learning)	Face to face						
Learning and teaching strategies	Lecturing, discussion, self-study, take home exams.						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	To teach principles of audio engineering Technologies To teach principles of acoustics and its applications						
Learning outcomes	After taking this course students will be able to; Know audio electronics. Know signal processing, including compression and equalization Understand Noise. Understand Acoustic Wave Equation						
Course Content	Principles of audio electronics and the decibel scale; electromagnetic induction; power, ground, and amplifiers; core concepts in digital audio; console and DAW signal flow, routing, and gain staging; microphone and loudspeaker principles and applications; signal processing, including compression and equalization, Sound and Image relation, Noise, Programming for Sound: Synthesis, Acoustic, Vibration and Waves, Acoustic Wave Equation and its Basic Physical Measures, reverberation period and its design application						
Mode of Delivery	In class						
References	1- Glen Ballou (ed.) — Handbook for Sound Engineers, 5th Ed, 2015 2- Sound Reproduction: The Acoustics and Psychoacoustics of Loudspeakers and Rooms, Floyd E. Toole, 2017						

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Principles of audio electronics and the decibel scale; electromagnetic induction; power, ground, and amplifiers
2. Week	Principles of audio electronics and the decibel scale; electromagnetic induction; power, ground, and amplifiers
3. Week	Core concepts in digital audio; console and DAW signal flow, routing, and gain staging; microphone and loudspeaker principles and applications;
4. Week	Core concepts in digital audio; console and DAW signal flow, routing, and gain staging; microphone and loudspeaker principles and applications;
5. Week	signal processing, including compression and equalization,
6. Week	signal processing, including compression and equalization,
7. Week	Sound and Image relation, Noise,
8. Week	Sound and Image relation, Noise,
9. Week	Programming for Sound: Synthesis, Acoustic, Vibration and Waves,
10. Week	Programming for Sound: Synthesis, Acoustic, Vibration and Waves,
11. Week	Programming for Sound: Synthesis, Acoustic, Vibration and Waves,
12. Week	Acoustic Wave Equation and its Basic Physical Measures,
13. Week	Acoustic Wave Equation and its Basic Physical Measures,
14. Week	reverberation period and its design application
15. Week	Repeat

16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%
Quiz	2	%10
Fieldwork	0	%0
Practice	0	%0
Take Home Exam	2	%10
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%50
Total	20	%100
Contribution of semester Works to success points	19	%60
Contribution of final exam to success points	1	%50
Total	20	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	3	42
Laboratory			
Quiz	2	6	12
Specific practical training			
Take Home Exam	2	5	10
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	25	25
Final Exam (Study duration)	1	30	30
Total Workload	20	69	119

Form VIIb (English): en

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.					X
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.				X	
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.			X		
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.			X		
5 Ability to design and conduct experiments, gather data, analyze and			X		

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually				X	
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions			X		
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in				X	

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERİNG AND ARCHITECTURE
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE NAME

Course Name	EEE 475 – Digital Broadcasting and Transmission
Course Type	Elective
Code	3
ECTS	5
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members
Prequisites	None
Semestre	Fall
Course Content	Digital Transmission Standards, Video Compression Techniques, Performance measures for Digital TV, Packet Structure, Multiplexing and De-multiplexing. Channel Coding and Modulation for Digital Television, Cyclic codes, Digital TV Transmitters, Transmission Lines: Cables, Wave Guides, link budget calculation, Transmitting Antennas for Digital Broadcasting, Advanced Topics: COFDM, LDPC Codes, Satellite Broadcasting, IPTV and Multi-platform formats.
Learning Outcomes	After taking this course students will be able to; Know Digital Transmission Standards. Know Performance measures for Digital TV Understand Satellite Broadcasting. Understand Digital TV Transmitters and Transmission Lines Familiar with IPTV and Multi-platform.
References	1- IoannisPitas, Digital video and television, 2013
Learning and teaching strategies	Lecturing, discussion, report preparation and submission.
Evaluation	Laboratory activities 15%, Quizzes 15%, mid-term 30%, and final exam 40%
Course Language	English

Form IIIb (English): COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Negotiation Process	EEE475	Fall	3	0	0	3	5
Prequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery (face to face,distance learning)	Face to face						
Learning and teaching strategies	Lecturing, discussion, self-study, take home exams.						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	After taking this course students will be able to; learn Digital Transmission Standards. learn Performance measures for Digital TV Understand Satellite Broadcasting. Understand Digital TV Transmitters and Transmission Lines understand IPTV and Multi-platform.						
Learning outcomes	After taking this course students will be able to; Know Digital Transmission Standards. Know Performance measures for Digital TV Understand Satellite Broadcasting. Understand Digital TV Transmitters and Transmission Lines Familiar with IPTV and Multi-platform.						
Course Content	Digital Transmission Standards, Video Compression Techniques, Performance measures for Digital TV, Packet Structure, Multiplexing and De-multiplexing. Channel Coding and Modulation for Digital Television, Cyclic codes Digital TV Transmitters, Transmission Lines: Cables, Wave Guides, link budget calculation, Transmitting Antennas for Digital Broadcasting, Advanced Topics: COFDM, LDPC Codes., Satellite Broadcasting, IPTV and Multi-platform formats.						
Mode of Delivery	In class / Distance / Hybrid						

References	1- IoannisPitas, Digital video and television, 2013.

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Digital Transmission Standards (ATSC, DVB-T/T2, DVB-S/S2).
2. Week	Video Compression Techniques: MPEG-2, H.264, HEVC, J2K.
3. Week	Performance measures for Digital TV: Noise, Error, Impairments.
4. Week	Packet Structure: Tables (PAT, PMT).
5. Week	Multiplexing and De-multiplexing.
6. Week	Channel Coding and Modulation for Digital Television.
7. Week	Cyclic codes
8. Week	Digital TV Transmitters: Up/converters, Power Amplifiers, Combiners,
9. Week	Equalizers and pre-correctors.
10. Week	Transmission Lines: Cables, Wave Guides, link budget calculation.
11. Week	Transmitting Antennas for Digital Broadcasting.
12. Week	Advanced Topics: COFDM, LDPC Codes.
13. Week	Satellite Broadcasting.

14. Week	IPTV and Multi-platform formats.
15. Week	Repeat
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%
Quiz	2	%10
Fieldwork	0	%0
Practice	0	%0
Take Home Exam	2	%10
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%50
Total	20	%100
Contribution of semester Works to success points	19	%60
Contribution of final exam to success points	1	%50
Total	20	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	3	42
Laboratory			
Quiz	2	6	12
Specific practical training			
Take Home Exam	2	5	10
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	25	25
Final Exam (Study duration)	1	30	30
Total Workload	20	69	119

Form VIIb (English): en

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.					X
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.				X	
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.			X		
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.			X		
5 Ability to design and conduct experiments, gather data, analyze and			X		

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually				X	
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions			X		
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in				X	

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 476-Artificial Intelligence	Fall	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Elective					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)						
Course objective	The objective of the course is to present an overview of artificial intelligence (AI) principles and approaches. Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: Search, Knowledge representation, inference, logic, and learning.					
Course Content	Semantic nets and description matching. Generate and test, Means-ends analysis, and problem reduction. Nets and basic search. Nets and optimal search. Trees and adversarial search. Rules and rule chaining. Rules, substrates, and cognitive modeling. Frames and inheritance. Frames and commonsense. Numeric constraints and propagation. Symbolic constraints and propagation. Logic and resolution proof. Backtracking and truth maintenance. Planning. Learning by analyzing differences. Learning by explaining experience. Learning by correcting mistakes. Learning by recording cases. Learning by managing multiple models. Learning by building identification trees. Learning by training neural nets. Learning by training perceptrons. Learning by training approximation nets. Learning by simulating evolution. Recognizing objects. Describing images. Expressing language constraints. Responding to questions and commands.					
References	1. Patrick Henry Winston, Artificial Intelligence1992/Third Edition, Addison-Wesley. 2. David L. Poole and Alan K. Mackworth, Artificial Intelligence: Foundations of Computational Agents, 2017/Second Edition, Cambridge University Press. 3. Nils Nilsson, The Quest for Artificial Intelligence: A History of Ideas and Achievements, 2009, Cambridge University Press. 4. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 2020/Fourth Edition, Pearson Education, Inc.					
Learning outcomes	After taking this course students will be able to;					

	1. Design algorithms for engineering problems under given memory and space constraints 2. Demonstrate understanding of the impact of technology on society 3. Demonstrate knowledge of contemporary issues related with computer engineering 4. Write programs in new programming languages

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	Goal trees and problem solving
2	Rule-based expert systems; Frames and inheritance
3	Basic search
4	Optimal search
5	Constraints in interpretation & recognition
6	Nearest neighbor learning
7	Midterm Exam
8	Identification tree learning
9	Neural net learning
10	Genetic algorithms
11	Support-vector machines
12	Learning from near misses
13	Probabilistic inference
14	Projects Presentations
15	Recitation
16	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	
Laboratory	0	
Quiz	0	
Fieldwork	0	
Practice	0	
Homework Assessment	0	
Presentation	0	
Project	1	%30
Seminar	0	
Mid-term Exams	1	%30
Final Exam	1	%40
Total	17	%100
Contribution of semester Works to success points	16	%60
Contribution of final exam to success points	1	%40
Total	17	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Quiz			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14
Presentation / Seminar Preparation			
Project	1	48	48
Homework assignment			
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	26	26
Total Workload			150
Total Workload/30 hours			150/30
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3					X
4		X			
5			X		
6		X			
7		X			
8	X				
9	X				
10	X				
11		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 477- Mobile Communications	Fall	3	0	0	3	5

Prerequisites	None
Course Language	English
Course Type	Technical Elective
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid
Learning and teaching strategies	Lecturing, discussion and submission.
Instructor (s)	Ercument KARAPINAR, PhD
Course objective	The goal of the course is to teach the fundamental concepts about noise and link budget in mobile and wireless communication systems, propagation in wireless communication channels and statistical modelling of the channel, effect of the channel on performance, diversity and multiple access in communication systems, and also to introduce contemporary communication systems.
Course Content	• Noise and link budget analysis, • Propagation in wireless communication channels and statistical channel characterisation, • Effect of the channel on communication performance, • Diversity techniques, • Multiple Access techniques, • GSM and Wi-Fi air interface.
References	Molisch, Wireless Communications, 2.Ed., Wiley, 2011 Sklar, Digital Communications: Fundamental and Applications, 2. Ed., Prentice Hall, 2001
Learning outcomes	Student, who passed the course satisfactorily will be able to know: • Propagation mechanisms in wireless communication channel and statistical modelling of the channel, • Effect of the wireless channel on the communication performance and ways to tackle it, • Contemporary mobile communication systems.

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction, Gain and Loss, Basic Antenna Parameters, Thermal Noise, Noise Temperature, Noise Factor, Link Margin, Link Budget Analysis
2. Week	Gain and Loss, Basic Antenna Parameters, Thermal Noise, Noise Temperature, Noise Factor, Link Margin, Link Budget Analysis
3. Week	Electromagnetic Propagation: Reflection, Refraction, Diffraction, Scattering
4. Week	Statistical Modelling of Wireless Communication Channels: Two-path channel model, Small Scale Fading: Rayleigh channel model, Ricean Channel Model, Nakagami-m Channel Model, Fading Margin, Doppler Spectrum, Level Crossing Rate, Average Duration of F
5. Week	Statistical Modelling of Wireless Communication Channels: Large Scale Fading: Log-normal Distribution, Suzuki Model, Fading Margin
6. Week	Statistical Modelling of Wideband Channels: Inter-symbol interference, Delay spread: Two-path model, Channels with Multiple Scatterers, Frequency Selective Channels, Deterministic Time Varying Channel Modelling, WSSUS Channel Model, Tapped Delay Line
7. Week	Midterm Exam
8. Week	Standard Channel Models: Narrowband Channel Models: Deterministic and Statistical Approaches, Hata-Okumura Model, COST 231 Model, Motley-Keenan Model, Wideband Channel Models: Tapped Delay Line Model, Exponential Model, COST 207 Model
9. Week	Demodulation in Fading Channels: Adaptation of the Signal Space Representation, MAP/ML Detector, Probability of Error Calculation in Flat Fading Channels
10. Week	Diversity Techniques: Correlation Coefficient, Spatial, Temporal, Spectral and Other Diversity Techniques, Diversity with Selection, Switching, and Combining (Maximal Ratio Combiner, Equal Gain Combiner), Probability of Error Calculation with Diversi
11. Week	Multiple Access Techniques: Multiplexing and Multiple Access, Performance Comparison of FDM/A, TDM/A, FDMA and TDMA, Cellular Networks, Frequency Reuse, Cell Planning
12. Week	Fundamentals of OFDM, Transmitter-Receiver Structure, Frequency Selective Channels and Cyclic Prefix.
13. Week	GSM Systems: Air Interface, Logical and Physical Channels, Link Establishment and Handover
14. Week	Wi-Fi Systems: OFDMA based Local Networks, IEEE 802.11a/g, Packet Transmission in IEEE 802.11.
15. Week	Course review

16. Week	Final exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			144
Total Workload/30 hours			4.88
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 478- Broadband Digital Communications	Fall	3	0	0	3	5

Prerequisites	None
Course Language	English
Course Type	Technical Elective
Mode of Delivery (face to face,distance learning)	Face to face/Distance Learning/Hybrid
Learning and teaching strategies	Lecturing, discussion and submission.
Instructor (s)	Ercument KARAPINAR, PhD
Course objective	The goal of the course is to teach the fundamental concepts about digital broad band communication systems, propagation in broad band communication channels and effect of the channel on performance, and also to introduce contemporary communication systems.
Course Content	Characterization of broadband wireline and wireless channels. Intersymbol Interference (ISI) effects. Equalization methods to mitigate ISI including single-carrier and multicarrier techniques. Equalization techniques and structures including linear, decisionfeedback, precoding, zero-forcing, mean square-error, FIR versus IIR. Multi-Input MultiOutput (MIMO) Equalization. Implementation issues including complexity, channel estimation, error propagation, etc. Real-world case studies from Digital Subscriber Lines (DSL).
References	“Digital Communications” 5th Edition by Proakis and Salehi, McGraw Hill
Learning outcomes	Student, who passed the course satisfactorily will have : • Ability to Characterize broadband wireline and wireless channels in terms of time/frequency selectivity • Ability to design single-carrier linear equalization schemes • Ability to design single-carrier decision-feedback equalization schemes • Ability to design multi-carrier equalization schemes such as OFDM • Ability to design multi-input multi-output (MIMO) equalization schemes

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction to Broadband Networking: Services and Technology
2. Week	Digital Subscriber Line
3. Week	Cable Modem Service
4. Week	Passive Optical Networks (PONs)
5. Week	Long Term Evolution (LTE)
6. Week	IP QoS Control Mechanisms
7. Week	Midterm
8. Week	Asynchoronous Transfer Mode
9. Week	Multi-Protocol Label Switching (MPLS)
10. Week	IP Multimedia Sub-system (IMS)
11. Week	IP Multimedia Sub-system (IMS)
12. Week	Broadband Services
13. Week	Broadband Services
14. Week	Opportunities, Threats, and Disruptive Technologies
15. Week	Course review

16. Week	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Homwwork / Quiz	5	%15
Mid-term Exam	1	%35
Final Exam	1	%50
Total	7	%100
Contribution of semester Works to success points	6	%50
Contribution of final exam to success points	1	%50
Total	7	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	14	2	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			144
Total Workload/30 hours			4.88
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1				X	
2					X
3				X	
4				X	
5				X	
6		X			
7				X	
8		X			
9		X			
10			X		
11				X	

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 479- Machine Vision	Fall	3	0	0	3	5
Prerequisites	None					
Course Language	English					
Course Type	Technical Elective					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)						
Course objective	Aim of this course is to teach students how to use mathematical modeling tools to represent digital images and perform transformations, filtering, morphological operations, recognition and classification. study motion using stereo vision techniques and optical flow methods.					
Course Content	Fundamental digital image processing and machine vision concepts and their application to the fields of robotics and automation. Topics include: digital image processing, image formation, two dimensional transforms, boundary descriptors, motion, camera calibration, vision for robot control, 3-D vision, and hardware architectures to support vision. U					
References	1. Richard Szeliski, Computer Vision: Algorithms and Applications, Springer 2010 2. D.A. Forsyth & J. Ponce, Computer Vision, A Modern Approach, Prentice Hall, 2003. 3. Linda G. Shapiro & George C. Stockman, Computer Vision, Pearson, 2001.					
Learning outcomes	After taking this course students will be able to; 1. Use mathematical modeling tools to represent digital images 2. Perform transformations and filtering operations in the time and frequency domains to achieve desired outputs such as edge detection, noise removal, line and corner detection, and image smoothing. 3. Apply morphological operations for shape recognition and template matching 4. Use advanced algorithms such as support vector machines and artificial neural networks for object recognition and classification. 5. Use stereo vision techniques and optical flow methods to study motion. 6. Use contemporary numerical and simulation tools to implement methods and algorithms					

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	Introduction
2	Binary Image Processing
3	Color Image Processing
4	Regions and Segmentation
5	Edge Detection
6	Photometric Stereo
7	Midterm Exam
8	Linear Models & Optimization
9	Shape from Shading
10	Dynamic Vision
11	Structure from Motion
12	Stereo and Calibration
13	Vision for Robot Control
14	Projects Presentations
15	Recitation
16	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	
Laboratory	0	
Quiz	0	
Fieldwork	0	
Practice	0	
Homework Assessment	0	
Presentation	0	
Project	1	%30
Seminar	0	
Mid-term Exams	1	%30
Final Exam	1	%40
Total	17	%100
Contribution of semester Works to success points	16	%60
Contribution of final exam to success points	1	%40
Total	17	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Quiz			

Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14
Presentation / Seminar Preparation			
Project	1	48	48
Homework assignment			
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	26	26
Total Workload			150
Total Workload/30 hours			150/30
ECTS			5.00

Form VIIb (English): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
1				X	
2					X
3					X
4		X			
5			X		
6		X			
7		X			
8	X				
9	X				
10	X				
11		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE SYLLABUS

COURSE NAME

Course Name	EEE 480 – Lasers and Industrial Applications
Course Type	Elective
Code	3
ECTS	5
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members
Prequisites	None
Semestre	Fall
Course Content	Laser Fundamentals: Einstein Coefficients and Light Amplification, Laser Rate Equations, Optical Resonators, Properties of Lasers, Lasers in Industry, Applications in Material Processing, Laser Welding,Hole Drilling,Cutting, Laser Tracking
Learning Outcomes	After taking this course students will be able to; Know Laser Fundamentals Know Properties of High Power Lasers Know Lasers in Industry, Understand Applications in Material Processing Understand Laser Welding Understand Hole Drilling Understand Cutting Understand Laser Tracking
References	1- Lasers, Fundamentals and Applications, Thyagarajan K., Ghatak A., Springer, 2011 2- High-Power Diode Lasers: Fundamentals, Technology, Applications, Roland Diehl, Springer Science & Business Media, 416.
Learning and teaching strategies	Lecturing, discussion, report preparation and submission.
Evaluation	Laboratory activities 15%, Quizzes 15%, mid-term 30%, and final exam 40%
Course Language	English

Form IIIb (English): COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Negotiation Process	EEE480	Fall	3	0	0	3	5
Prequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery (face to face,distance learning)	Face to face						
Learning and teaching strategies	Lecturing, discussion, self-study, take home exams.						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	To make students understand the negotiation process and prepare them to handle this process To teach students, Laser Fundamentals High Power Lasers Lasers in Industry, Laser Applications in Material Processing						
Learning outcomes	After taking this course students will be able to; Know Laser Fundamentals Know Properties of High Power Lasers Know Lasers in Industry, Understand Applications in Material Processing Understand Laser Welding Understand Hole Drilling Understand Cutting Understand Laser Tracking						
Course Content	Laser Fundamentals: Einstein Coefficients and Light Amplification, Laser Rate Equations, Optical Resonators, Properties of Lasers, Lasers in Industry, Applications in Material Processing, Laser Welding,Hole Drilling,Cutting, Laser Tracking						
Mode of Delivery	In class						
References	1- Lasers, Fundamentals and Applications, Thyagarajan K., Ghatak A., Springer, 2011						

	2- High-Power Diode Lasers: Fundamentals, Technology, Applications, Roland Diehl, Springer Science & Business Media, 416.

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Laser Fundamentals: Einstein Coefficients and Light Amplification,
2. Week	Laser Fundamentals: Laser Rate Equations, Optical Resonators,
3. Week	Properties of Lasers,
4. Week	High Power Lasers
5. Week	CO_2 lasers
6. Week	Fiber Lasers
7. Week	Lasers in Industry
8. Week	Applications in Material Processing
9. Week	Laser Welding
10. Week	Hole Drilling
11. Week	Cutting,
12. Week	Laser Tracking
13. Week	Laser Safety

14. Week	New Developments in the field
15. Week	Repeat
16. Week	Final examination

Form Vb (İngilizce): Assesment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%
Quiz	0	%0
Fieldwork	0	%0
Practice	0	%0
Take Home Exam	2	%20
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%50
Total	20	%100
Contribution of semester Works to success points	19	%50
Contribution of final exam to success points	1	%50
Total	20	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	3	42
Laboratory			
Quiz			
Specific practical training			
Take Home Exam	2	5	10
Study Hours Out of Class (Preliminary work, reinforcement, ect)			
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	25	25
Final Exam (Study duration)	1	30	30
Total Workload	20	69	119

Form VIIb (English): en

Program Outcomes	Contribution Level*				
	1	2	3	4	5
1 Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.					X
2 Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.				X	
3 Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.			X		
4 Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.			X		X
5 Ability to design and conduct experiments, gather data, analyze and			X		

interpret results for investigating complex engineering problems or discipline specific research questions					
6 Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually				X	
7 Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions			X		
8 Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself			X		
9 Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice					X
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in				X	

entrepreneurship, innovation; knowledge about sustainable development					
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .		X			

1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest