Elektrik Elektronik MÜHENDİSLİĞİ BÖLÜMÜ

MÜFREDAT EL KİTABI

ANKARA, 2025

ELECTRICAL ELECTRONICS ENGINEERING DEPARTMENT

CURRICULUM HANDBOOK

ANKARA, 2025

ANKARA BİLİM ÜNİVERSİTESİ

ELEKTRİK ELEKTRONİK MÜHENDİSLİĞİ BÖLÜMÜ

MİSYON

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.

VİZYON

Ankara Bilim Üniversitesi, Elektrik Elektronik Mühendisliği Bölümü, modern dünyanın ihtiyaçlarını öngörerek ve yaygın kullanım alanı olan bilginin teknolojiye, teknolojinin de ürün ve uygulamaya dönüşümünde görev alabilecek nitelikli mühendisler yetiştirmeyi amaçlamaktadır. Elektrik Elektronik Mühendisliği Bölümü güçlü bir temel altyapı üzerine oturtulmuş seçenekli uzmanlık açılımları sağlayan öğretimi, modern imkanlar ve deneyimli öğretim kadrosu ile desteklenmiş bir mühendislik programını sunmaktadır. Bu program ile mezunlarımızın iş bulma kaygısı yaşamadan doğrudan iş hayatında yer bulabilmeleri için, akademik çalışmalar yanında proje uygulamaları, üniversite ve iş dünyası işbirliği, stajyerlik imkanları öngörülmektedir.

Elektrik Elektronik Mühendisliği bölümünün öncelikli hedefleri arasında öğrenci odaklı sorun ve problemlerin ivedilikle ve etik prensiplere uygun olarak çözülmesi yer almaktadır. Kısacası, öğrenci odaklı ve aynı zamanda etik değerlere hassasiyet gösteren ve etik prensiplerle donatılmış, mesleğini severek yapan, özgüveni tam, proje odaklı eğitim modeli ile mühendisler yetiştirmeyi şiar edinmiş bir mühendislik ekolü oluşturma yolumuza devam etme hedefimizdir.

ANKARA SCIENCE UNIVERSITY

DEPARTMENT OF ELECTRICAL ELECTRONICS ENGINEERING

MISSION

Our department's primary objectives include cultivating engineers who are passionate about their profession, possess full confidence, are project-oriented, and adapt to technological advancements through a hands-on education model. Our department aims to open new doors to science for our students and introduce them to the modern world of technology. In this context, we are committed to continuing our journey with the principle of establishing an engineering tradition.

VISION

Ankara Science University’s Department of Electrical and Electronics Engineering aims to train qualified engineers who can foresee the needs of the modern world and take part in transforming knowledge into technology and technology into products and applications with broad areas of utilization. The department offers an engineering program supported by a robust foundational framework, specialized expertise tracks, modern facilities, and an experienced academic staff. This program integrates academic studies with practical applications, industry-university collaborations, and internship opportunities, enabling our graduates to seamlessly transition into the workforce without concerns about employment prospects.

Among the primary goals of the Electrical and Electronics Engineering Department is to address student-focused issues and challenges promptly and in accordance with ethical principles. In short, our vision is to establish an engineering tradition that is both student-centered and deeply sensitive to ethical values, dedicated to nurturing engineers who are passionate about their profession, possess full confidence, and excel in a project-oriented education model equipped with ethical principles.

	I. YARIYIL				
Kod	**Ders adı**	**T**	**U**	**UK**	**AKTS**
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	0	3	5
PHY 103	Physics I LAB	0	2	1	1
BIO 101	Molecular Biology ang Biochemistry	3	0	3	5
HIS 101	Principles of Ataturk and History of Revolutions I	2	0	2	2
TUR 101	Turkish I	2	0	2	2
OHS 101	Occupational Health and Safety I	1	0	1	1
TOPLAM		**20**	**4**	**22**	**30**
	II. YARIYIL				
Kod	**Ders adı**	**T**	**U**	**UK**	**AKTS**
EEE 102	Introduction to EEE	2	0	2	3
OHS 102	Occupational Health and Safety	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	0	3	5
PHY 104	Physics II LAB	0	2	1	1
HIS 102	Principles of Ataturk and History of Revolutions II	2	0	2	2
TUR 102	Turkish II	2	0	2	2
CENG 102	Algorithms and Programming with Java II	3	4	5	8
TOPLAM		**19**	**6**	**22**	**30**
	III. YARIYIL				
Kod	**Ders adı**	**T**	**U**	**UK**	**AKTS**
MATH 201	Vector and Complex Calculus	4	0	4	6
EEE 201	Circuit Theory I	4	0	4	6
MATH 224	Linear Algebra & Differential Equations	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	Academic English III	2	0	2	2
	Non-Departmental Elective I	3	0	3	3
TOPLAM		**21**	**3**	**22**	**30**
	IV. YARIYIL				
Kod	**Ders adı**	**T**	**U**	**UK**	**AKTS**
MATH 206	Probability Theory and Statistics	3	0	3	5

EEE 202	Circuit Theory II	4	0	4	6
EEE 208	Signal and Systems	3	0	3	5
EEE 236	Electromagnetic Field Theory	3	0	3	5
EEE 204	Electronics I	3	0	3	5
EEE 212	Circuit Theory Lab	0	2	1	2
ENG 202	Academic English IV	2	0	2	2
TOPLAM		**18**	**2**	**19**	**30**
	V. YARIYIL				
Kod	**Ders adı**	**T**	**U**	**UK**	**AKTS**
EEE 301	Telecommunications I	3	2	4	6
EEE 303	Electromagnetics Wave Theory	3	0	3	5
EEE 313	Electronics II	3	0	3	5
EEE 331	Electrical Machines	3	2	3	5
EEE 321	Digital Signal Processing	3	0	3	5
EEE 315	Electronics Lab	0	2	1	2
ENG 301	Academic English V	2	0	2	2
TOPLAM		**20**	**4**	**22**	**30**
	VI. YARIYIL				
Kod	**Ders adı**	**T**	**U**	**UK**	**AKTS**
EEE 302	Telecommunications II	3	2	4	5
EEE 304	Control Theory	3	2	4	5
EEE 306	Microprocessors	3	2	4	5
ENG 302	Academic English VI	2	0	2	2
	Technical Elective I	3	0	3	5
	Technical Elective II	3	0	3	5
	Non-Departmental Elective II	3	0	3	3
TOPLAM		**20**	**6**	**23**	**30**
	VII. YARIYIL				
Kod	**Ders adı**	**T**	**U**	**UK**	**AKTS**
EEE 491	Graduation Project I	3	2	4	5
	Technical Elective III	3	0	3	5

	Technical Elective IV	3	0	3	5
	Technical Elective V	3	0	3	5
	Technical Elective VI	3	0	3	5
	Non-Departmental Elective III	3	0	3	3
CCE401	Critical Thinking, Creativity and Entrepreneurship	2	0	2	2
Total		**20**	**2**	**21**	**30**
	VIII. YARIYIL				
Kod	**Ders adı**	**T**	**U**	**UK**	**AKTS**
EEE 492	Graduation Project II	3	2	4	5
EEE 490	Long Term Practice	0	25	6	25
TOPLAM		**3**	**27**	**10**	**30**
	TOPLAM KREDİ	**141**	**54**	**161**	**240**

	Technical Elective				
Kod	**Ders adı**	**T**	**U**	**UK**	**AKTS**
EEE 312	Utilization of Electrical Energy	3	0	3	5
EEE 322	Programmable Logic Controller	3	0	3	5
EEE324	Microwave Electronics	3	0	3	5
EEE326	CMOS VLSI Design, HDL	3	0	3	5
EEE328	Introduction to Robotics	3	0	3	5
EEE330	Electrical & Electronics Measurements	3	0	3	5
EEE332	Electrical Energy Transmission and Distribution	3	0	3	5
EEE334	Introduction to Machine Learning	3	0	3	5
EEE336	Biomedical Signals and Instrumentation	3	0	3	5
EEE338	Optical Fiber Communications	3	0	3	5
EEE423	Antennas and Propagation	3	3	3	5
EEE 455	Wireless Networking Technologies and Applications	3	3	3	5
EEE 421	Digital Image Processing	3	3	3	5
EEE425	Process Control	3	3	3	5
EEE 468	Numerical Methods in EE	3	3	3	5
EEE 471	High Voltage Techniques	3	3	3	5
EEE431	Power System Analysis	3	3	3	5
EEE433	Artificial Intelligence	3	3	3	5
EEE 477	Mobile Communications	3	3	3	5
EEE435	Power System Protection	3	3	3	5
EEE 467	Renewable Energy	3	3	3	5
EEE 484	Power Electronics	3	3	3	5
EEE 472	Power System Design	3	3	3	5

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Algorithms and Programming with Java-I	**CENG 101**	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/Distance Learning/Hybrid						
Learning and teaching strategies	Lecturing, discussion and submission.						
Instructor (s)	Asst. Prof. Faruk Tokdemir, Asst. Prof. Hasan Karaaslan						
Course objective	• To understand the use of predefined classes and objects. • To understand fundamentals of a computer and programming topics, • To develop basic computational thinking skills, i.e., algorithmic thinking • To get familiar with fundamental concepts and terminology in computer programming • To be able to use an integrated development environment to design and write code in the Java programming language. • To define and correctly use data types, decision structures, arrays, conditionals and loops. • To understand the use of predefined classes and objects.						
Course Content	• Define the fundamentals of computers, introduce topics of computer engineering and programming with Java. • Introduce computer organization and peripherals • Give an overview of the Binary number system, logic gates and adders, flip-flop and registers • Explain RAM and hard disk concepts • Explain the role of microprocessors and machine language • Introduce programming with Java • Explain fundamental data types						

	• Explain decision making structures • Explain control flow and looping • Explain the role of classes and objects in Java • Define the attribute and method features of Java • Define simple data structures such as arrays and array lists
References	Big Java: Late Objects, by Cay S. Horstmann, John Wiley & Sons Inc., ISBN: 978-1-118-08788-6 Java Software Solutions: Foundations of Program Design, Lewis & Loftus, 8th Edition, Pearson
Learning outcomes	After taking this course students will be able to; • Understand the basic knowledge of computers, topics of computer engineering and programming with Java • Understand the basic concepts of computer organization and its peripherals • Understand basic electronical elements which form up a computer and their basic calculation principles • Develop programs in Java in order to solve beginner level problems • Have gained the necessary knowledge to continue with studying further Java course subjects

SUBJECTS BY WEEKS

Weeks	Subjects
1. Week	Fundamental concepts of Computer science
2. Week	Basics of Computer Architecture
3. Week	Computer Programs, Java Programming Language
4. Week	Software errors, Problem Solving, Fundamentals of Algorithm Design
5. Week	Fundamental Data Types
6. Week	Input and Output, Display the results, Problem solving, Java String type
7. Week	Decision using if Statement, Comparing Numbers and Strings, Multiple Alternatives
8. Week	Midterm Exam
9. Week	Nested Branches, Problem Solving
10. Week	Loops, Implement while, for and do loops
11. Week	Read and Process data set, Problem Solving: Storyboards, Common Loop algorithms, Nested Loops, their applications

12. Week	Methods, Implementing Methods
13. Week	Decomposing complex tasks into simpler ones
14. Week	Arrays & Array List, Arrays, Enhanced For Loop
15. Week	Two Dimensional Arrays, Array & Array Lists
16. Week	Final Exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	12	%30
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	0	%0
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	26	%100
Contribution of semester Works to success points	13	%60
Contribution of final exam to success points	1	%40
Total	14	%100

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory	12	2	24
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			
Midterms (Study duration)	1	15	15
Final Exam (Study duration)	1	20	20
Total Workload			185
Total Workload/30 hours			6.17
ECTS			6.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
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
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	
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.				X	
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal 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 instructions and receiving skills.				X	

Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X			
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.			X		
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	

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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Calculus I	**MATH 101**	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)	Dr. Berrin Şentürk, Dr. Neslihan Ayşen Özbay, Dr. Seher Fişekci Par						
Course objective	To teach basic preliminaries on functions and inequalities, to teach limits and continuity, to teach derivatives and its applications, to teach definite integral and some methods of integration.						
Course Content	Real numbers and the real line, intervals, absolute value, Equations and inequalities involving absolute value, Graphs of Quadratic Equations, circles, parabolas, shifting a graph, ellipses and hyperbolas. Functions, domain and range, graphs, even and odd functions, combining functions, composite functions, piecewise defined functions. Trigonometric functions, identities, graphs of trigonometric functions. Transcendental functions. Limits and Continuity. Limits at infinity and infinite limits. Differentiation, Applications of Derivatives, Integration, Applications of Definite Integral, Techniques of Integration, Improper Integrals						
References	1. Thomas' Calculus, 11 th Edition, G.B. Thomas, Jr. and M. D. Weir and J. Hass, Addison-Wesley, 2009, ISBN 978-0-7167-2105-5 2. Calculus: A Complete Course, 7 th Edition, Robert A.Adams and C. Essex, Pearson 2010, ISBN 978-0-7167-2105-5						
Learning outcomes	After taking this course, 1) The students will have learnt basic preliminaries on functions and inequalities 2) The students will have learnt limits and continuity 3) The students will have learnt derivatives.						

	4) The students will have learnt some optimization problems. 5) The students will have learnt definite integrals, methods of integration and its applications 6) Identify the relevance of mathematical methods to a variety of conceptualised engineering examples. 7) Use analytical and computational methods for solving problems by relating sinusoidal wave and vector functions to their respective engineering applications. 8) Examine how differential and integral calculus can be used to solve engineering problems. 9) Use applications of number theory in practical engineering situations.

SUBJECTS BY WEEKS

Weeks	Subjects
1. Week	Real numbers and the real line, intervals, absolute value, equations and inequalities involving absolute value
2. Week	Graphs of Quadratic Equations, circles, parabolas, shifting a graph, ellipses and hyperbolas
3. Week	Functions, domain and range, graphs, even and odd functions, combining functions, composite functions, piecewise defined functions
4. Week	Trigonometric functions, identities, graphs of trigonometric functions
5. Week	Transcendental functions
6. Week	Limits and Continuity
7. Week	Mid- term exam
8. Week	Differentiation
9. Week	Differentiation, Applications of Derivatives
10. Week	Applications of Derivatives
11. Week	Applications of Derivatives
12. Week	Integration

13. Week	Applications of Definite Integral
14. Week	Techniques of Integration
15. Week	Techniques of Integration, Improper Integrals
16. Week	Final Exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	0	%0
Presentation	0	%0
Quiz	5	%10
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%40
Final Exam	1	%60
Total	21	%100
Contribution of midterm to success points	1	%40
Contribution of final exam to success points	1	%50
Total	23	%100

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	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment(quiz)	14	2	28
Midterms (Study duration)	1	10	10
Final Exam (Study duration)	1	16	16
Total Workload			180
Total Workload/30 hours			6.00
ECTS			6.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
Adequate knowledge of mathematics, science and knowledge on related discipline-specific issues; the ability to use theoretical and practical knowledge in these areas in complex engineering problems.					x
Ability to identify, define, formulate and solve complex engineering problems; selecting and applying appropriate analysis and modeling methods for this purpose.				x	
Ability to design a complex system, process,				X	

device or product under realistic constraints and conditions to meet specific requirements; the ability to apply modern design methods for this purpose.					
Ability to develop, select and use modern techniques and tools necessary for analyzing and solving complex problems in engineering applications; the ability to use information technologies effectively.				X	
Ability to design experiments, conduct experiments, collect data, analyze and interpret results for the investigation of complex engineering problems or discipline-specific research topics.				X	
Ability to work effectively in disciplinary and multidisciplinary teams; ability to work Individually.		X			
Effective communication skills in Turkish verbal and written communication; At least one foreign language knowledge; Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give and receive clear and understandable instructions.	x				

Awareness of the necessity of life-long learning; Access to knowledge, ability to follow developments in science and technology, and constant self-renewal.	x				
Conformity to ethical principles, professional and ethical responsibility awareness; Information on standards used in engineering applications.	x				
Information on practices in business, such as project management, risk management and change management; Entrepreneurship, awareness of innovation; Information on sustainable development.	x				
Information on the effects of engineering applications on health, environment and safety in universal and social dimensions and on the problems of contemporary engineering; awareness of the legal consequences of engineering solutions.	x				

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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Physics I	**PHYS 101**	Fall	3	2	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)	Dr. Neslihan GÖKÇEK, Dr. Vedat TANRIVERDİ						
Course objective	The main objective of this course is to help students to develop an understanding of fundamental physical concepts and principles related to mechanics and an ability to use these concepts and principles to analyze and solve broad range of quantitative problems in the real world. This course also will teach student how to communicate scientific ideas effectively.						
Course Content	Definition of accuracy and significance of results in a measurement. Expressing vector quantities using different methods. Description of motion in one- and multi-dimensions and their application to various problems. Introduction of Newton's laws of motion and conservation laws, and their applications to various problems. Description of rotational motion and their applications specifically rigid bodies in static equilibrium. Using mechanical laws to describe planetary motion and fluids mechanics.						
References	3. SEARS AND ZEMANSKY'S University Physics with Modern Physics, 15th Ed. by Young and Freedman, Pearson (2020).						
Learning outcomes	After taking this course, 10) Learning significance and accuracy concepts in a measurement. 11) Applying knowledge of math, science, and engineering to everyday mechanical physics problems. 12) Learning how to communicate and share scientific ideas. 13) Learning concept of motion and its application to one- and multi-dimension problems.						

	14) Application of Newton's laws and conservation laws to broad range of problems including planetary motion and fluid mechanics.

SUBJECTS BY WEEKS

Weeks	Subjects
1. Week	Units, Physical Quantities, and Vectors
2. Week	Units, Physical Quantities, and Vectors
3. Week	Motion along a straight line
4. Week	Motion along a straight line
5. Week	Motion in two or three dimensions
6. Week	Newton's Laws of Motion
7. Week	Newton's Laws of Motion Application
8. Week	Newton's Laws of Motion Application MIDTERM
9. Week	Work, Kinetic and Potential Energy and Energy Conservation
10. Week	Momentum, Impulse, and Collisions
11. Week	Rotation of Rigid Bodies
12. Week	Dynamics of Rotational Motion
13. Week	Equilibrium and Elasticity
14. Week	Peridodic Motion
15. Week	Final Exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	4-7	%15
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	0	%0
Presentation	0	%0
Quiz	5	%10
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%35
Final Exam	1	%40
Total	16	%100
Contribution of midterm to success points	1	%40
Contribution of final exam to success points	1	%60
Total		%100

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		5	70

Presentation / Seminar Preparation				
Project				
Homework assignment(quiz)	14		2	28
Midterms (Study duration)	1		10	10
Final Exam (Study duration)	1		16	16
Total Workload				180
Total Workload/30 hours				6.00
ECTS				6.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
Adequate knowledge of mathematics, science and knowledge on related discipline-specific issues; the ability to use theoretical and practical knowledge in these areas in complex engineering problems.					x
Ability to identify, define, formulate and solve complex engineering problems; selecting and applying appropriate analysis and modeling methods for this purpose.				x	
Ability to design a complex system, process, device or product under realistic constraints and conditions to meet specific requirements; the ability to apply modern				X	

design methods for this purpose.					
Ability to develop, select and use modern techniques and tools necessary for analyzing and solving complex problems in engineering applications; the ability to use information technologies effectively.				X	
Ability to design experiments, conduct experiments, collect data, analyze and interpret results for the investigation of complex engineering problems or discipline-specific research topics.				X	
Ability to work effectively in disciplinary and multidisciplinary teams; ability to work Individually.		X			
Effective communication skills in Turkish verbal and written communication; At least one foreign language knowledge; Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give and receive clear and understandable instructions.	x				
Awareness of the necessity of life-long learning; Access to knowledge, ability to follow developments in	x				

science and technology, and constant self-renewal.					
Conformity to ethical principles, professional and ethical responsibility awareness; Information on standards used in engineering applications.	x				
Information on practices in business, such as project management, risk management and change management; Entrepreneurship, awareness of innovation; Information on sustainable development.	x				
Information on the effects of engineering applications on health, environment and safety in universal and social dimensions and on the problems of contemporary engineering; awareness of the legal consequences of engineering solutions.	x				

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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Physics I Lab	**PHY103**	Fall	0	0	2	1	1
Prerequisites							
Course Language	English						
Course Type	Compulsory						
Mode of	Face to face						
Learning and teaching strategies	Application Analyze Reporting						
Instructor (s)	Dr. Neslihan GÖKÇEK, Dr. Vedat TANRIVERDİ						
Course objective	Upon the successful completion of this course, students will establish the relationship between mechanics and engineering. This includes to provide students the concepts of mechanics with doing experiments.						
Course Content	Measurements, motion in one dimension, Hooke's law, application of Newton's laws, conservation of energy and momentum						
References	1. R. A. Serway & J. W. Jewett, Physics for Scientists and Engineers (6th Ed.), Brooks Cole (2007). 2. H. D. Young and R. A. Freedman, University Physics 12th-14th Ed. Pearson (2008, 2016). 3. Principles of Physics by Halliday, Resnick, and Walker (10th Edition), John Wiley (2014)						
Learning outcomes	1. Learn how to apply the basic concepts of mechanics, kinetics by experiments 2. The ability to analyze a problem graphically 3. Learn to work within a group						

SUBJECTS BY WEEKS

Weeks	Experiment Names
1. Week	Preparation
2. Week	Significant Figures and Measurement

3.	Week	Significant Figures and Measurement
4.	Week	Calculating Gravitational Acceleration
5.	Week	Calculating Gravitational Acceleration
6.	Week	Hooke’s Law
7.	Week	Hooke’s Law
8.	Week	Newton’s Second Law
9.	Week	Newton’s Second Law
10.	Week	Parallel and Series Connections of Springs
11.	Week	Parallel and Series Connections of Springs
12.	Week	Collisions in One Dimension
13.	Week	Collisions in One Dimension

ASSESSMENT METHODS:

	Type	Total Contribution
1	The first three experiments	40
2	The last three experiments (%66) and final exam(%33)	60

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)			
Laboratory	7	2	14
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	7	2	14
Presentation / Seminar Preparation			
Project			
Homework assignment			

Midterms (Study duration)			
Final Exam (Study duration)	1	10	10
Total Workload			38
Total Workload/30 hours			1.27
ECTS			1

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Course Outcomes**				
	1	**2**	**3**	**4**	**5**
Adequate knowledge of mathematics, science and knowledge on related discipline-specific issues; the ability to use theoretical and practical knowledge in these areas in complex engineering problems.	5	5	5	5	5
Ability to identify, define, formulate and solve complex engineering problems; selecting and applying appropriate analysis and modeling methods for this purpose.		2	5	5	
Ability to design a complex system, process, device or product under realistic constraints and conditions to meet specific requirements; the ability to apply modern design methods for this purpose.			5	5	
Ability to develop, select and use modern techniques and tools necessary for analyzing and solving complex problems in engineering applications; the ability to				4	

use information technologies effectively.					
Ability to design experiments, conduct experiments, collect data, analyze and interpret results for the investigation of complex engineering problems or discipline-specific research topics.		2		5	
Ability to work effectively in disciplinary and multidisciplinary teams; ability to work Individually.					
Effective communication skills in Turkish verbal and written communication; At least one foreign language knowledge; Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give and receive clear and understandable instructions.					
Awareness of the necessity of life-long learning; Access to knowledge, ability to follow developments in science and technology, and constant self-renewal.					
Conformity to ethical principles, professional and ethical responsibility awareness; Information on standards used in engineering applications.					

Information on practices in business, such as project management, risk management and change management; Entrepreneurship, awareness of innovation; Information on sustainable development.					
Information on the effects of engineering applications on health, environment and safety in universal and social dimensions and on the problems of contemporary engineering; awareness of the legal consequences of engineering solutions.					

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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/ week)	Application (hours/ week)	Laboratory (hours/ week)	National Credit	ECTS
Molecular biology and Biochemistry	**BIO101**	Fall	3	0	0	3	5
Prerequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery	Face to face						
Learning and teaching strategies	Lecturing, discussion and submission.						
Instructor (s)	Ayşe ÖZDEMİR, PhD						
Course objective	Students should have learn molecular biology, biochemistry and genetics to understand basic applications of biology in engineering.						
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 research and applications.						
References	1. Campbell Biology, Lisa Urry, Michael Cain, et al., 12th Ed.,2020. 2. BRS Biochemistry, Molecular Biology & Genetics, 8.th ed., M.A. Lieberman, R. Ricer 3. Lodish, U. H. (2016). Molecular Cell						
Learning outcomes	After taking this course students will be able to; 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						

SUBJECTS BY WEEKS

Weeks	**Subjects**
1. Week	Themes of Biology
2. Week	The Chemical Foundation of Life

3. Week	Biological Macromolecules
4. Week	Cellular Organization
5. Week	Cellular Metabolism
6. Week	Cell Communication
7. Week	Cell Cycle
8. Week	Midterm Exam
9. Week	Mendel Genetics
10. Week	The Molecular Basis of Inheritance
11. Week	Gene Expression
12. Week	Biotechnology
13. Week	Molecular Evolution and Its Mechanisms
14. Week	Why Bioinformatics? Biological Big Data and Databases
15. Week	Repeat
16. Week	Final Exam

ASSESSMENT METHOD

Semester Works	**Number**	**Contribution**
Attendance	14	0%
Laboratory	0	0%
Application	0	0%
Fieldwork	0	0%
Practice	0	0%
Homework Assessment	0	0%
Quiz	0	0%
Presentation	0	0%
Project	0	0%
Seminar	0	0%
Mid-term Exams	1	40%
Final Exam	1	60%
Total	30	100%

Contribution of semester Works to success points	29	40%
Contribution of final exam to success points	1	60%
Total	30	100%

WORKLOAD AND ECTS CALCULATION

Activities	**Number**	**Duration (hour)**	**Total Workload**
Course Duration (x14)	14	3	42
Laboratory	0	0	0
Application	0	0	0
Specific practical training	0	0	0
Field activities	0	0	0
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	7	4	28
Presentation / Seminar Preparation	0	0	0
Project	0	0	0
Homework assignment	0	0	0
Quiz	0	0	0
Midterms (Study duration)	1	35	35
Final Exam (Study duration)	1	45	45
Total Workload	150		
Total Workload/30 hours	5		
ECTS	5		

PROGRAM LEARNING OUTCOMES - COURSE LEARNING OUTCOMES MATRIX

Program Learning Outcomes	**Course Learning Outcomes**				
	LO1	LO2	LO3	LO4	LO5
PO-1				4	
PO-2			4		

PO-3		3			
PO-4			5		
PO-5			3		
PO-6			5		
PO-7			5		
PO-8				4	
PO-9					5
PO-10	4				
PO-11			5		

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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Algorithms and Programming with Java-II	**CENG 102**	Spring	3	0	4	5	8
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)	Asst. Prof. Faruk Tokdemir, Asst. Prof. Hasan Karaaslan						
Course objective	• To continue learning the Java language and understand more advanced features and semantics of the Java programming • Proficient programming in the Java language and analyze, design, development, and debugging techniques appropriate for the Java • To understand the concepts of classes, objects, and encapsulation • To apply object-oriented design techniques for building complex programs in a systematic manner. • To become familiar with common user-interface components and apply them to real world problems • To understand several sorting and searching algorithms, and estimate and compare the performance of different algorithms						
Course Content	Material covered in the Algorithms and Programming with Java-II course (Java II) is the continuation of the Algorithms and Programming with Java-I course (Java I). We assume, students have successfully taken and passed the Java I course. The Java II course will continue to explore the Java language and fundamentals, and gives you an opportunity to put the basic computer literacy, design and programming skills to solve real problems of mathematics, modeling, and computation. o Implementation of classes, inheritance, interfaces, methodology for object oriented design and development.						

	○ Graphical user interfaces design, (buttons, text components, drawing exc.). ○ Input/output files reading and writing and exception handling, recursion, searching and sorting algorithms. ○ Java Collections Frameworks will be presented from the perspective of a library use. • Student will get weekly 4 hours of Lab experiments and many small projects, and home works. The ultimate goal is to produce a commercial-quality program, which is well structured, documented, bug-free and easy to use. Students will be expected to display creativity and an ability to learn independently.
References	Big Java: Late Objects, by Cay S. Horstmann, John Wiley & Sons Inc., ISBN: 978-1-118-08788-6 Java Software Solutions: Foundations of Program Design, Lewis & Loftus, 8th Edition, Pearson
Learning outcomes	After taking this course students will be able to; ○ Solve real problems pertaining to mathematics, modeling and computation with the basic knowledge of computer literacy, design and programming skills ○ Have learned and understood more advanced features and semantics of the Java language ○ Have proficient programming skills in the Java language and analyze, design, develop and debug problems appropriately for Java ○ Employ object-oriented design and development through Implementation of classes, inheritance, interfaces, methodology and understand the concepts of classes, objects and encapsulation ○ Apply object-oriented design techniques for building complex programs systematically ○ Become familiar with common user-interface problems and apply related solutions to real world problems • Have understood several sorting and searching algorithms, estimate and compare space and time limitations of different algorithms

SUBJECTS BY WEEKS

Weeks	Subjects
1. Week	**Ch.8 Objects and Classes** To understand the concepts of classes, objects, and encapsulation. The public interface of a class, implementing instance method, constructors. To be able to design, implement and test your own classes. Static variables and static methods.

2. Week	**Ch.8 Objects and Classes** Week 1 topics continue
3. Week	**Ch.9 Inheritance & Interface** Inheritance and inheritance hierarchies, implementation of subclasses that inherit and override superclass methods, the concept of polymorphism. Common superclass Object and its methods and working with interface types
4. Week	**Ch.9 Inheritance & Interface** Week 3 topics continue
5. Week	**Ch.12 Object Oriented Design** Inheritance, aggregation, and dependency relationships between classes using UML class diagrams. Object oriented design techniques to building complex programs. Package usage to organize programs
6. Week	**Ch.10 Graphical User Interfaces** Implementation of basic graphical user interfaces, buttons, text fields, and other components to a frame window, handle events that are generated by buttons. Programming that display simple drawings.
7. Week	**Ch.11 Advanced User Interfaces** Layout managers to arrange user-interface components in a container. Common user-interface components, such as radio buttons, check boxes, and menus. events handling generated by user-interface components. Effective Java documentation.
8. Week	Midterm Exam
9. Week	**Ch.7 Input/output and Exception Handling** Read and Write text files, text input and output. Process command line arguments. Exception handling, throwing and catching exceptions, some examples and programming tips. Implementation programs that propagate checked exceptions and handling input errors.
10. Week	**Ch.7 Input/Output and Exception Handling** Week 9 topics continue
11. Week	**Ch.13 Recursion** The relationship between recursion and iteration, Use recursive helper methods. When the use of recursion affects the efficiency of an algorithm, efficiency of algorithm. Analyze problems much easier to solve by recursion. Recursive structures using mutual recursion
12. Week	**Ch.14 Sorting & Searching**

	Several sorting and searching algorithms and their performance evaluations. Analyzing the performance of the selection sort algorithm, analyzing the merge sort algorithm. To estimate and compare the performance of algorithms. Estimating the running time of an algorithm. Sorting and Searching in the Java Library
13. Week	**Ch.14 Sorting & Searching** Week 12 topics continue
14. Week	**Ch.15 The Java Collections Framework** Overview of the collection framework and the collection classes supplied in the Java library. Linked lists, sets, maps implementation. To choose appropriate collections for solving programming problems. To study applications of stacks and queues
15. Week	**Ch.15 The Java Collections Framework** Week 14 topics continue
16. Week	Final Exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	14	%35
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	0	%0
Presentation	0	%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	15	%60
Contribution of final exam to success points	1	%40

Total	16	%100

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory	14	4	56
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	7	4	28
Midterms (Study duration)	1	15	15
Final Exam (Study duration)	1	20	20
Total Workload			245
Total Workload/30 hours			8.17
ECTS			8.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
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
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	

Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.				X	
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal 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 instructions and receiving skills.				X	
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X			
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.			X		
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	

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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Introduction to EEE	**EEE 102**	Spring	2	0	0	2	3
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)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	This course aims to introduce students to the foundational concepts of electrical and electronic engineering, focusing on the principles, analysis, and design of basic electrical circuits and electronic components. Students will develop an understanding of core topics of electronics, while gaining hands-on experience through practical applications and projects to prepare for advanced study and real-world engineering challenges.						
Course Content	General view of electrical and electronic engineering, Engineering and ethics, Introduction of Companies in the Field of Electrical and Electronic Engineering, 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. About The Department and Laboratories. Tools and methods used in the field.						
References	1. Introduction to Electrical and Computer Engineering, Charles B Fleddermann; Martin D Bradshaw, Upper Saddle River: Prentice Hall, 2003. 2. JW Nilson, SA Riedel, Electric Circuits, Pearson Education, 8th Ed., 2008. 3. AR Hambley, Electrical Engineering Principles and Applications, Pearson Education, 6th Ed., 2016. 4. Bird, John. Electrical and Electronic Principles and Technology. 7th ed., Routledge, 2021. 5. Hayt, W. H., Kemmerly, J. E., and Durbin, S. M., Engineering Circuit Analysis, Tata McGraw Hill.						

Learning outcomes	To create awareness about the contents of electrical and electronic engineering and to attract the students to the profession. To be able to define the basic concepts of Electrical and Electronics Engineering. To be able to analyze and design simple electrical and electronic circuits to solve a particular problem.

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 / Introduction of Companies in the Field of Electrical and Electronic Engineering
4. Week	Interaction Between EEE And Other Engineering Disciplines and Science
5. Week	About The Department and Laboratories/ Introduction to Faculty Members and Research Areas/ Lecture Plan
6. Week	Introduction of Basic Circuit Element /Circuit Elements Voltage and Current Concept
7. Week	Mid- Term Exam
8. Week	Circuit Concept, Series and Parallel Circuits /Ohm's Law, Kirchhoff's Current and Voltage Laws
9. Week	Node Voltage Method, Loop Current Method
10. Week	Capacitors And Inductor/ Logic Circuits Elements
11. Week	Operational Amplifiers / Semiconductors
12. Week	Introduction Laboratory

13. Week	Introduction Laboratory Equipment
14. Week	Usage of Simulation Program for the Project Design
15. Week	Project Control
16. Week	Final Examination

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	0	%0
Presentation	0	%0
Quiz	2	%10
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%40
Final Exam	1	%60
Total	18	%100
Contribution of midterm to success points	1	%40
Contribution of final exam to success points	1	%50
Total	20	%100

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	2	28

Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)			
Presentation / Seminar Preparation			
Project			
Homework assignment(quiz)	14	2	28
Midterms (Study duration)	1	10	10
Final Exam (Study duration)	1	16	16
Total Workload			84
Total Workload/30 hours			3.00
ECTS			3.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
Adequate knowledge of mathematics, science and knowledge on related discipline-specific issues; the ability to use theoretical and practical knowledge in these areas in complex engineering problems.					x
Ability to identify, define, formulate and solve complex engineering problems; selecting and applying appropriate analysis and modeling methods for this purpose.				x	
Ability to design a complex system, process,				X	

device or product under realistic constraints and conditions to meet specific requirements; the ability to apply modern design methods for this purpose.					
Ability to develop, select and use modern techniques and tools necessary for analyzing and solving complex problems in engineering applications; the ability to use information technologies effectively.				X	
Ability to design experiments, conduct experiments, collect data, analyze and interpret results for the investigation of complex engineering problems or discipline-specific research topics.				X	
Ability to work effectively in disciplinary and multidisciplinary teams; ability to work Individually.		X			
Effective communication skills in Turkish verbal and written communication; At least one foreign language knowledge; Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give and receive clear and understandable instructions.	x				

Awareness of the necessity of life-long learning; Access to knowledge, ability to follow developments in science and technology, and constant self-renewal.	x				
Conformity to ethical principles, professional and ethical responsibility awareness; Information on standards used in engineering applications.	x				
Information on practices in business, such as project management, risk management and change management; Entrepreneurship, awareness of innovation; Information on sustainable development.	x				
Information on the effects of engineering applications on health, environment and safety in universal and social dimensions and on the problems of contemporary engineering; awareness of the legal consequences of engineering solutions.	x				

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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Physics II	**PHYS 102**	Spring	3	2	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)	Dr. Neslihan GÖKÇEK, Dr. Vedat TANRIVERDİ						
Course objective	The main objective of this course is to teach students the fundamental laws of electricity and magnetism and how to use this knowledge in understanding the operation of basic electrical and magnetic circuit elements. This course will also teach students the description of light as electromagnetic waves.						
Course Content	Definition of charge and electric fields. Determination of electric field due to a point charge or to a charge distribution. Using Gauss's law for symmetric charge distributions. Definition of electric potential and capacitance. Foundation of basic circuit elements. Definition of magnetic field and source of magnetic fields. Inductance and analyses of basic direct and alternating circuits. Using Maxwell's laws to describe the light as an electromagnetic wave.						
References	4. SEARS AND ZEMANSKY'S University Physics with Modern Physics, 15th Ed. by Young and Freedman, Pearson (2020). 5. Physics for Scientists and Engineers 8th Ed with Modern Physics by Serway and Jewett, Thomson, Brooks/Cole.						
Learning outcomes	After taking this course, 15) Learning significance and accuracy concepts in a measurement. 16) Applying knowledge of math, science, and engineering to everyday mechanical physics problems. 17) Learning how to communicate and share scientific ideas. 18) Learning concept of motion and its application to one- and multi-dimension problems.						

	19) Application of Newton's laws and conservation laws to broad range of problems including planetary motion and fluid mechanics.

SUBJECTS BY WEEKS

Weeks	Subjects
1. Week	Course Introduction and Vector Calculus Review
2. Week	Ch21.Electric Charge and Electric Field
3. Week	Ch.22.Gauss's Law
4. Week	Ch23.Electric Potential
5. Week	Ch. 24. Capacitance and Dielectrics
6. Week	Ch. 25. Current, Resistance, and Electromotive Force
7. Week	Ch. 26. Direct-Current Circuits
8. Week	MIDTERM
9. Week	Ch. 27. Magnetic Field and Magnetic Forces
10. Week	Ch. 28. Sources of Magnetic Field
11. Week	Ch. 29. Electromagnetic Induction
12. Week	Ch. 30. Inductance
13. Week	Ch. 31. Alternating Current
14. Week	Ch. 32. Electromagnetic Waves
15. Week	Catch-up and review /

16. Week	Final Exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	4-7	%15
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	0	%0
Presentation	0	%0
Quiz	5	%10
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%35
Final Exam	1	%40
Total	16	%100
Contribution of midterm to success points	1	%40
Contribution of final exam to success points	1	%60
Total		%100

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	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment(quiz)	14	2	28
Midterms (Study duration)	1	10	10
Final Exam (Study duration)	1	16	16
Total Workload			180
Total Workload/30 hours			6.00
ECTS			6.00

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Calculus II	**MATH 102**	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)	Dr. Berrin Şentürk, Dr. Neslihan Ayşen Özbay, Dr. Seher Fişekçi Par						
Course objective	The main objective for this course is to acquaint you with fundamental calculus concepts involving functions of more than one variable, and to help you to understand and apply such functions in a variety of settings. The course aims to study infinite sequences and series, convergence test for series, absolute and conditional convergence, and Taylor polynomials and power series, volumes of rotation, integration techniques, partial derivatives, and local extrema of two variable functions, double and triple integrals.						
Course Content	Sequences, Series, Taylor Series, Vectors in R^2 and R^3, Dot and Cross Products, Lines and Planes in R^3, Functions of Several Variables, Limits and Continuity, Partial Derivatives, Directional Derivatives, Maximum and Minimum Values, Lagrange Multipliers, Double Integrals, Triple Integrals, Vector Functions, Limits and Derivatives.						
References	1. Calculus (Metric Version), 8th (or 7th) Edition, by James Stewart 2. Calculus, 14th Edition, by George B. Thomas (Supplementary Book) 3. Calculus, Multivariable 2nd Edition by Brian E. Blank, Steven G. Krantz						
Learning outcomes	Upon successful completion of this course, a student will be able to: 1. Test series for convergence and divergence, represent elementary and transcendental functions of one variable as Taylor or Maclaurin series 2. Perform vector operations such as vector addition, scalar multiplication, dot product and cross product						

	3. Relate vector operations to geometric notions and structures such as distance, projection, orthogonality, parallelism, lines, and planes in R^3 4. Solve maximum and minimum problems and apply the method of Lagrange multipliers for multivariable functions 5. Evaluate limits, partial derivatives, directional derivatives, multiple integrals of multivariable functions 6. Compute limits, derivatives and integrals of vector functions. 7. Expose to the concept of three-dimensional analytical geometry.

SUBJECTS BY WEEKS

Weeks	Subjects
1. Week	11.1 Sequences 11.2 Series 11.3 The integral test, the Limit of a Function,
2. Week	11.4 The comparison tests 11.5 Alternating series
3. Week	11.6 Absolute Convergence, the Ratio and Root Tests 11.8 Power Series
4. Week	11.9 Representation of Functions as Power Series 11.10 Taylor and Maclaurin Series
5. Week	12.1 3D Coordinate Systems 12.2 Vectors 12.3 The Dot Product 12.4 The Cross Product
6. Week	12.5 Equations of Lines and Planes 12.6 Cylinders and Quadric Surfaces

7. Week	13.1 Vector functions and space curves 13.2 Derivatives and integrals of vector functions 13.3 Arc Length
8. Week	**Midterm Exam**
9. Week	13.4 Velocity and Acceleration 14.1 Functions of Several Variables
10. Week	14.2 Limits and Continuity 14.3 Partial Derivatives
11. Week	14.4 Tangent Planes and Linear Approximations 14.5 The chain rule 14.6 Directional Derivatives and the Gradient Vector
12. Week	14.7 Maximum and Minimum Values 14.8 Lagrange Multipliers
13. Week	15.1 Double integrals over rectangles 15.2 Double integrals over general regions 15.3 Double integrals in polar coordinates
14. Week	15.6 Triple integrals 15.7 Triple integrals in cylindrical coordinates
15. Week	15.8 Triple integrals in spherical coordinates 15.9 Change of variable in multiple integrals
16. Week	Final Exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	0%
Laboratory	0	0%
Application	8	0%
Fieldwork	0	0%
Practice	0	0%
Homework Assessment	1	5%
Presentation	0	0%
Quiz	0	0%
Project	0	0%
Seminar	0	0%
Mid-term Exams	1	40%
Final Exam	1	55%
Total	30	100%
Contribution of midterm to success points	29	45%
Contribution of final exam to success points	1	55%
Total	30	100%

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	4	56
Laboratory	0	0	0
Application	0	0	0
Specific practical training	0	0	0
Field activities	0	0	0
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	6	84
Presentation / Seminar Preparation	0	0	0
Project	0	0	0

Homework assignment(quiz)	1	5	5
Midterms (Study duration)	1	15	15
Final Exam (Study duration)	1	20	20
Total Workload			180
Total Workload/30 hours			6.00
ECTS			6.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
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
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	
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to				X	

use information technologies effectively.					
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.				X	
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal 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 instructions and receiving skills.				X	
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X			
Information on business practices such as project management, risk			X		

management and change management; awareness about entrepreneurship and innovation; information on sustainable development.					
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	

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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Physics II Lab	**PHY104**	Spring	0	0	2	1	1
Prerequisites							
Course Language	English						
Course Type	Compulsory						
Mode of	Face to face						
Learning and teaching strategies	Application Analyze Reporting						
Instructor (s)	Dr. Neslihan GÖKÇEK, Dr. Vedat TANRIVERDİ						
Course objective	Upon the successful completion of this course, students will establish how to measure the basic quantities in electricity and magnetism.						
Course Content	Basic measurements and experiments on electricity and magnetism.						
References	1. R. A. Serway & J. W. Jewett, Physics for Scientists and Engineers (6th Ed.), Brooks Cole (2007). 2. H. D. Young and R. A. Freedman, University Physics 12th-14th Ed. Pearson (2008, 2016). 3. Principles of Physics by Halliday, Resnick, and Walker (10th Edition), John Wiley (2014)						
Learning outcomes	1. Learn the basic circuit elements e.g. resistor, capacitor, coil 2. Learn how to measure the basic quantities of electricity and magnetism. 3. Learn the basic applications of electromagnetism. 4. Learn how to draw a graph and represent basic findings. 5. To make group work						

SUBJECTS BY WEEKS

Weeks	Experiment Names
1. Week	Introduction to laboratory
2. Week	Introduction to laboratory
3. Week	Color codes for resistors and measurements
4. Week	Color codes for resistors and measurements
5. Week	Verifying Ohm's law
6. Week	Verifying Ohm's law
7. Week	Resistors in Series and Parallel
8. Week	Resistors in Series and Parallel
9. Week	Equipotential Lines and Electric Field
10. Week	Equipotential Lines and Electric Field
11. Week	Charging and discharging a capacitor
12. Week	Charging and discharging a capacitor
13. Week	Magnetic fields
14. Week	Magnetic fields

ASSESSMENT METHOD

I. Lab Reports: 80%

II. Final Exam: (closed book): 20%

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)			
Laboratory	7	2	14
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	7	2	14

Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)			
Final Exam (Study duration)	1	10	10
Total Workload			38
Total Workload/30 hours			1.27
ECTS			1

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Course Outcomes**				
	1	**2**	**3**	**4**	**5**
Adequate knowledge of mathematics, science and knowledge on related discipline-specific issues; the ability to use theoretical and practical knowledge in these areas in complex engineering problems.	5	5	5	5	5
Ability to identify, define, formulate and solve complex engineering problems; selecting and applying appropriate analysis and modeling methods for this purpose.		2	5	5	
Ability to design a complex system, process, device or product under realistic constraints and conditions to meet specific requirements; the ability to apply modern design methods for this purpose.			5	5	
Ability to develop, select and use modern techniques and tools necessary for analyzing				4	

and solving complex problems in engineering applications; the ability to use information technologies effectively.					
Ability to design experiments, conduct experiments, collect data, analyze and interpret results for the investigation of complex engineering problems or discipline-specific research topics.		2		5	
Ability to work effectively in disciplinary and multidisciplinary teams; ability to work Individually.					
Effective communication skills in Turkish verbal and written communication; At least one foreign language knowledge; Ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give and receive clear and understandable instructions.					
Awareness of the necessity of life-long learning; Access to knowledge, ability to follow developments in science and technology, and constant self-renewal.					
Conformity to ethical principles, professional and ethical responsibility awareness; Information					

on standards used in engineering applications.					
Information on practices in business, such as project management, risk management and change management; Entrepreneurship, awareness of innovation; Information on sustainable development.					
Information on the effects of engineering applications on health, environment and safety in universal and social dimensions and on the problems of contemporary engineering; awareness of the legal consequences of engineering solutions.					

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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Digital Design	**EEE 203**	Fall	3	0	2	4	5
Prerequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery	Face to face/Distance Education						
Learning and teaching strategies	Lectures, Experiments, Problem Solving.						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	To provide an understanding on the running principles and to teach fundamental concepts used in analysis and design of digital circuits and systems.						
Course Content	Number systems and codes, Boolean algebra and logic gates, minimization of Boolean functions, combinational circuits, design of combinational circuits, analysis and design of sequential circuits, flip-flops, counters, shift registers, memory elements, programmable logic devices (PLD), design with PLDs. Introduction to alu and microinstructions						
References	o M. Morris Mano, Michael D. Ciletti, Digital Design: With an Introduction to the Verilog HDL, VHDL, and SystemVerilog,6th Edition, 2019 Pearson. o Digital Design, Principles and Practices, Author: John F. Wakerly, Pearson International Edition o Digital Design and Computer Architecture, D. Harris, S. Harris (Author), Morgan Kaufmann						
Learning outcomes	After taking this course, students will be able to; o Able to analyze and design combinational circuits and optimize the design using tools such as Boolean algebra, Karnaugh map o Use arithmetic circuits using half adders, subtractors and full adders, subtractors in design solutions o Understand running principles synchronous sequential circuits with flip-flops, shift registers and counters, o Recognize ALU fundamentals and operations						

SUBJECTS BY WEEKS

Weeks	Subjects
1	Digital Systems, Binary Numbers,Number-Base Conversions, Complement of Numbers.
2	Arithmetic Operations in Digital Systems, Binary Codes, Binary Logic, Logic Gates.
3	Theorems and Properties of Boolean Algebra, Boolean Functions
4	Canonical and Standard Forms, Integrated Circuits
5	Gate Level Minimization, Karnaugh Map Method
6	Don't-Care Conditions, Universal Gates, NAND and NOR Implementation, Exclusive-OR Function
7	Analysis of Combinational Circuits, Design Procedure of Combinational Circuits, Binary Adder-Subtractor
8	Midterm
9	Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, Three-State Gates
10	Sequential Logic, Latches, Flip-Flops
11	Analysis of Synchronous Sequential Circuits, Meally and Moore Finite State Machines
12	State Reduction, Design Procedure, Excitation Tables, Synthesis using JK and T Flip-Flops
13	Shift Registers, Serial Transfer, Serial Addition, Universal Shift Register
14	Binary Ripple Counter, BCD Ripple Counter, Synchronous Counters, BCD Counter, Ring Counter.
15	Memory , RAM, ROM
16	Review of topics and contemporary implementations

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	12	%10
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Quizzes	2	%20
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	28	%100
Contribution of semester Works to success points	27	%60
Contribution of final exam to success points	1	%40
Total	28	%100

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory	12	2	24
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	2	28
Presentation / Seminar Preparation			

Project			
Quizzes	2	4	8
Midterms (Study duration)	1	10	10
Final Exam (Study duration)	1	20	20
Total Workload			132
Total Workload/30 hours			4.4
ECTS			5.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.					X
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
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
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.		X			
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.	X				
Ability to communicate effectively in verbal 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 instructions and receiving skills.	X				

Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X			
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.	X				
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				

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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Circuit Theory 1	**EEE201**	Fall	4	0	0	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 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.
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*

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

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

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

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 interpret results for investigating complex engineering problems or discipline specific research questions			X		
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 entrepreneurship, innovation; knowledge about sustainable development		X			
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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Linear Algebra and Differential Equations	**MATH 224**	Fall	3	0	0	3	5
Prerequisites	Math 101						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery	Face to face						
Learning and Teaching strategies	Lecturing, discussion, and submission.						
Instructor	Dr. Berrin Şentürk						
Course objective	This course aims to make the students familiar with the fundamental uses of linear algebra and differential equations in modeling mathematical and physical problems. Students should be able to understand how linear algebra is used to approximate equations in multidimensional settings, model and solve problems using matrices and differential equations.						
Course content	Systems of differential equations, classification of differential equations. First, second-order, and higher order linear differential equations. Method of undetermined coefficient, variation of parameters and Laplace transformation. Systems of linear equations, elimination methods, matrices and matrix operations. Invertible matrices, determinants. Vector spaces, basis, and dimension. Inner product spaces, orthogonality, orthogonal basis, rank and nullity. Eigenvalues and eigenvectors. Diagonalization of Matrices.						
References	1. Elementary Linear Algebra with Applications, Bernard Kolman and David R. Hill, 2014, 9th ed., new int. ed., Pearson 2. Advanced Engineering Mathematics, Cengage Learning, Peter V. O'Neil 3. Differential Equations and Linear Algebra, C.H. Edwards & D.E. Penney, 2010, 4th Edition, Prentice Hall 4. 4. Elementary Differential Equations and Boundary Value Problems,2013, Tenth Edition, William E. Boyce & Richard C. DiPrima, Wiley						
Learning Outcomes	Upon successful completion of this course, a student will be able to: 1. Express basic skills of ordinary differential equations and how such equations are used in engineering and science. 2. Demonstrate ability to think critically by determining and using appropriate techniques for solving a variety of differential equations. 3. Solve systems of linear equations; know the properties of matrices, compute, and use determinants to solve system of linear equations. 4. Analyze vectors in Euclidean spaces geometrically and algebraically, discuss the concepts of span, linear independence, basis, dimension, and apply these						

	concepts to various vector spaces. Determine and use orthogonality to find a basis for the null space of a matrix. 5. Compute eigenvectors and eigenvalues of a matrix and apply them to some diagonalization processes.

SUBJECTS BY WEEKS

Weeks	Subjects
1.week	Introduction to Differential Equations, General and Particular Solutions
2. week	Separable Equations and Applications, Linear 1st Order Equations
3.week	Substitution Methods and Exact Equations
4.week	Second Order Linear Differential Equations, General Solutions of Linear Equations
5.week	Homogeneous Equations with Constant Coefficients Method of Undetermined Coefficients
6.week	Variation of Parameters, Systems of Differential Equations
7.week	Laplace Transformation
8.week	Midterm Exam
9.week	Introduction to Linear Systems, Matrices and Gaussian Elimination, Reduced-Row Echelon Matrices
10.week	Matrix Operations, Inverses of Matrices
11.week	Determinants, Vectors and Vector Spaces
12.week	Subspaces, Linear Combinations, and Independence of Vectors
13.week	Row and Column Spaces, Orthogonal Vectors in R^n

14.week	Eigenvalues and Eigenvectors
15.week	Diagonalization of Matrices and Applications
16.week	Final Exam

ASSESSMENT METHOD

Semester Works	**Number**	**Contribution**
Attendance	14	0%
Laboratory	0	0%
Application	0	0%
Fieldwork	0	0%
Practice	10	0%
Homework Assessment	2	5%
Quiz	2	5%
Presentation	0	0%
Project	0	0%
Seminar	0	0%
Mid-term Exam(s)	1	40%
Final Exam	1	50%
Total	30	100%
Contribution of semester Works to success points	29	50%
Contribution of final exam to success points	1	50%
Total	30	100%

WORKLOAD AND ECTS CALCULATION

Activities	**Number**	**Duration (hour)**	**Total Workload**
Course Duration (x14)	14	3	42
Laboratory	0	0	0
Application	0	0	0
Specific practical training	0	0	0
Field activities	0	0	0
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation	0	0	0
Project	0	0	0
Homework assignment	2	3	6
Quiz	2	4	8

Midterms (Study duration)	1	9	9
Final Exam (Study duration)	1	15	15
Total Workload	150		
Total Workload/30 hours	5		
ECTS	5		

PROGRAM LEARNING OUTCOMES - COURSE LEARNING OUTCOMES MATRIX

Program Learning Outcomes	**Course Learning Outcomes**				
	LO1	**LO2**	**LO3**	**LO4**	**LO5**
1 Qualified knowledge of mathematics, science, and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.	**5**			**5**	
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.		**5**			
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.					
4 Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.					**5**
5 Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.			**5**		
6 Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.					
7 Ability to communicate effectively in verbal 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 instructions 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.					
9 To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.					
10 Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.					
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.					

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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Computer Tools for Electrical Engineering	**EEE 205**	Fall	2	0	1	2	3
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)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	To make students understand the negotiation process and prepare them to handle the processes and to teach students, Basic Matlab programming Graphic User Interface (GUI) design Design with PSpice Programming with Labview						
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.						
References	1- Matlab for Engineers, Holly Moore, 4th/5th ed, Pearson, 2019, New Jersey 2- Computer Tools For Electrical Engineers Matlab & Spice, James C. Squire, P.E. and Julie Phillips Brown, Elesevier Inc., 2021, Oxford UK. 3- Elementary Mathematical and Computational Tools for Electrical and Computer Engineers Using Matlab, J.T.Manassah,						
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

SUBJECTS BY WEEKS

Weeks	Subjects
1. Week	Introduction to Matlab
2. Week	Matlab Environment
3. Week	Built-in Functions, Usage of Matlab as calculator
4. Week	Manipulating Matlab matrices and Matrix Algebra
5. Week	Plotting and graphics
6. Week	Logical functions and selected structures
7. Week	Repetition Structures, Looping
8. Week	Midterm
9. Week	User defined functions and controlled input/output
10. Week	Graphical User Interface
11. Week	Spice
12. Week	Spice Applications
13. Week	Labview
14. Week	Labview Applications
15. Week	Review of the course

16. Week	Final Exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	7-10	%20
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%40
Final Exam	1	%40
Total	26	%100
Contribution of semester Works to success points	25	%60
Contribution of final exam to success points	1	%40
Total	26	%100

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	2	28
Laboratory	14	1	14
Application	0	0	0
Specific practical training	0	0	0
Field activities	0	0	0

Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14
Presentation / Seminar Preparation	0	0	0
Project	0	0	0
Homework assignment	7	2	14
Midterms (Study duration)	1	10	10
Final Exam (Study duration)	1	20	20
Total Workload			102
Total Workload/30 hours			3.4
ECTS			3.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.					X
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
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			
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.			X		
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal 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				X	

presentations, to give clear and understandable instructions and receiving skills.					
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.			X		
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.				X	
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.		X			
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			

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

COURSE INFORMATION

	Code	Semester	Theory (hours/ week)	Application (hours/ week)	Laboratory (hours/ week)	National Credit	ECTS
Vector and Complex Calculus	**MATH 201**	Fall	4	0	0	4	6
Prerequisites	MATH 102						
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)	Dr. Seher Fişekci Par						
Course objective	This course aims to provide students with the mathematical background which is needed to solve problems in engineering.						
Course Content	• Vector Calculus • Complex Analysis • Series Solutions to Differential Equations and Sturm-Liouville Theory • Laplace Transform • Fourier Series and Fourier Transform • Partial Differential Equations						
References	1. Advanced Engineering Mathematics, Wiley 9th edition, Erwin Kreyszig 2. F. B. Hildebrand, Advanced Calculus for Applications, 2nd Edition, Prentice-Hall, 1976. 3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley, 2000. 4. 4. S. L. Ross, Differential Equations, 3rd Edition, Wiley, 1984.						
Learning outcomes	After taking this course students will be able to 1. Understand divergence, gradient, curl and their physical meaning 2. Be able to use the integral theorems. 3. Understand the basics of complex analysis and applications 4. Learn how to solve initial value problems with Laplace transforms						

	5. Learn Fourier Series and Transforms

SUBJECTS BY WEEKS

Weeks	Subjects
1. Week	Vector Differential Calculus: Grad, Div, Curl
2. Week	Vector Integral Calculus: Integral Theorems
3. Week	Complex Numbers and Functions
4. Week	Power Series and Taylor Series
5. Week	Laurent Series and Residue Integration Quiz-1
6. Week	Conformal Mapping
7. Week	Mid Term Exam
8. Week	Complex Analysis and Potential Theory
9. Week	Systems of Ordinary Differential Equations
10. Week	Series Solutions to Differential Equations
11. Week	Sturm-Liouville Problems and Orthogonal Functions
12. Week	Laplace Transform: Definition and Properties Quiz-2
13. Week	Laplace Transform: Applications
14. Week	Fourier Series, Integrals and Transforms
15. Week	Partial Differential Equations
16. Week	Final Exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	
Laboratory		
Application		
Fieldwork		
Practice		
Homework Assessment		

Quiz	2	15%
Presentation		
Project		
Seminar		
Mid-term Exams	1	35%
Final Exam	1	50%
Total	6	100%
Contribution of semester Works to success points	5	50%
Contribution of final exam to success points	1	50%
Total	6	100%

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			
Quiz	2	2	8
Midterms (Study duration)	1	12	12
Final Exam (Study duration)	1	20	20
Total Workload	180		

Total Workload/30 hours	6.00
ECTS	6.00

COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	**Contribution Level***				
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.					X
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
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				
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.	X				
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.	X				
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.	X				
Ability to communicate effectively in verbal 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 instructions and receiving skills.	X				
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.	X				

To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.	X				
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.	X				
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				

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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Probability Theory and Statistics	**MATH 206**	Spring	3	0	0	3	5
Prerequisites	Math 101						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery	Face to face						
Learning and Teaching strategies	Lecturing, discussion, and submission						
Instructor(s)	Department Instructor(s)						
Course objective	Statistics and probability are two important sciences for dealing with variability, uncertainty and complexity in engineering, business, and many real-life applications. The overall course objective is to understand basic concepts of probability and statistics and to be able to use them to solve engineering problems. This course helps students to make inferences and justify conclusions from data collection, and use independence and conditional probability to interpret data. The course aims to learn to set up and work with discrete and continuous random variables and their distributions, know what the expectation and variance mean, and understand the law of large numbers and the central limit theorem.						
Course content	Basic concepts of probability (sample spaces and events, permutations, combinations, conditional probability, and independence). Discrete and continuous random variables, their probability distributions, expected value and distribution parameters. Discrete probability distributions: Binomial, geometric, negative binomial, Poisson distributions. Continuous probability distributions: uniform, normal, exponential, gamma, and chi-squared distributions. Jointly distributed and independent Random Variables. Covariance and correlation. The sampling distribution of sample mean. Central Limit Theorem and its applications. Estimation. Confidence Intervals, Hypothesis Testing.						
References	1. Probability & Statistics for Engineers & Scientists Ninth Edition, Ronald E. Walpole, R.H. Myers, S.H. Myers, Keying Ye 2. Probability and Statistics for Engineers and Scientists, Jay L. Devore, 5-th edition, ISBN 0-534-37281-3 3. Probability, Random Variables, and Stochastic Process 4th Edition A. Papoulis, S.U. Pillai ISBN-13: 978-0071226615						
	Upon successful completion of this course, a student will be able to:						

Learning Outcomes	1. Understand the basic knowledge on fundamental probability concepts, including random variables, probability of an event, additive rules, and conditional probability 2. Understand the concept of Bayes' theorem, the basic statistical concepts, and measures 3. Find expected values and variances of both discrete and continuous random variables 4. Understand several well-known distributions, including Binomial, Geometrical, Negative Binomial, Pascal, Normal and Exponential Distribution 5. Understand the concepts of various parameter estimation methods, like method of moments, maximum likelihood estimation (Expected value).

SUBJECTS BY WEEKS

Weeks	**Subjects**
1.week	Introduction to Probability theory, Sample Spaces and Events, Axioms, Interpretations, and Properties of Probability
2. week	Counting Methods, Conditional Probability Baye's Theorem Independence
3.week	Random Variables Probability Distributions for Discrete Random Variables
4.week	Probability Distributions for Continuous Variables Cumulative Distribution Functions
5.week	Conditional Distribution Joint Probability Distributions
6.week	Mean of a Random Variable, Expected Value and Standard Deviation
7.week	Variance and Covariance Conditional Expected Values
8.week	**Midterm Exam**
9.week	Chebyshev Inequality The Binomial Distribution The Hypergeometric Distribution
10.week	Geometric Distribution Negative Binomial Distribution Poisson Distribution

11.week	The Normal (Gaussian) Distribution Gamma Distributions, Exponential and Chi-Squared Distributions Other Continuous Distributions
12.week	Moment Generating Functions Random Sampling, Some Important Statistics
13.week	Sampling distributions Central Limit Theorem
14.week	Sampling Distribution of S^2 t-Distribution
15.week	Confidence Intervals for a Population Mean Testing Hypotheses About a Population Mean
16.week	**Final Exam**

ASSESSMENT METHOD

Semester Works	**Number**	**Contribution**
Attendance	14	0%
Laboratory	0	0%
Application	12	0%
Fieldwork	0	0%
Practice	0	0%
Homework Assessment	2	10%
Quiz	0	0%
Presentation	0	0%
Project	0	0%
Seminar	0	0%
Mid-term Exam(s)	1	35%
Final Exam	1	55%
Total	30	100%
Contribution of semester Works to success points	29	45%
Contribution of final exam to success points	1	55%
Total	30	100%

WORKLOAD AND ECTS CALCULATION

Activities	**Number**	**Duration (hour)**	**Total Workload**
Course Duration (x14)	14	3	42
Laboratory	0	0	0

Application	0	0	0
Specific practical training	0	0	0
Field activities	0	0	0
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation	0	0	0
Project	0	0	0
Homework assignment	2	5	10
Quiz	0	0	0
Midterms (Study duration)	1	12	12
Final Exam (Study duration)	1	16	16
Total Workload	150		
Total Workload/30 hours	5		
ECTS	5		

PROGRAM LEARNING OUTCOMES - COURSE LEARNING OUTCOMES MATRIX

Program Outcomes	**Course Learning Outcomes**				
	LO1	**LO2**	**LO3**	**LO4**	**LO5**
1 Qualified knowledge of mathematics, science, and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.	**5**			**5**	
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.		**5**			
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.					
4 Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.					**5**

5 Ability to design, conduct experiments, collect data, analyze, and interpret results to investigate complex engineering problems or discipline-specific research topics.			**5**		
6 Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.					
7 Ability to communicate effectively in verbal 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 instructions 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.					
9 To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		**5**			
10 Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.	**5**				
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.					

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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Circuit Theory II	**EEE201**	Fall	4	0	0	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 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*

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

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

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

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 interpret results for investigating complex engineering problems or discipline specific research questions			X		
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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Electromagnetic Field Theory	**EEE 206**	Spring	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, Lecturing and submission.						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	To provide a comprehensive understanding of the principles of electromagnetic fields and their applications in engineering and technology. To develop the analytical and problem-solving skills necessary to model, analyze, and design systems involving static and dynamic electromagnetic fields.						
Learning outcomes	LO-1: Calculate electrostatic fields and electrical potentials due to point charges and charge densities. LO-2: Calculate electrical potential, electrostatic field and capacitance for structures containing dielectric materials. 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's law of induction. LO-6: Calculate magnetostatic fields and magnetic flux for current-carrying cables, planar plates, toroids and solenoids. LO-7: Identify Maxwell’s equations and formulate uniform plane waves in lossless or lossy medium.						
Course Content	Review of vector algebra and vector analysis; Electrostatics: Basic electrostatic assumptions, Coulomb's law, Gauss's law and its applications, Electric potential, polarization; Steady electric current; Laplace and Poisson equations; Magnetostatics: Basic magnetostatic assumptions, Vector magnetic potential, Biot-Savart law and its applications, Behavior of magnetic materials, Magnetic energy, Magnetic forces and torque; Boundary conditions for electrostatic and magnetostatic fields; Time-varying fields and Maxwell's equations.						
Mode of Delivery	In class / Distance / Hybrid						

References	1. D.K.Cheng, Filed and Wave Electromagnetics, 2nd ed., David K.Cheng, AdissonWesley, 1989 2. F.T.Ulaby, Applied Electromagnetics, ,PrenticeHall, 2010 3. Sadiku, Matthew N.O., Elements of Electromagnetics (3rd ed.), Oxford University Pres, Inc., 2000. 4. Hayt, and J.A. Buck, "Engineering Electromagnetics", McGraw-Hill, 2007. 5. Thidé, Bo. *Electromagnetic Field Theory*. Uppsala: Uppsala University, 2004.

SUBJECTS BY WEEKS

Weeks	Subjects
1. Week	Vector Analysis (Scalars and Vectors, Vector algebra, Cartesian co-ordinate system, Vector components and Unit vectors)
2. Week	Cartesian, cylindrical and spherical coordinate systems / Transformations between coordinate systems / Stoke and Divergence Theorems
3. Week	Coulomb's Law / Electric Field Intensity
4. Week	Gauss's Law and its applications in free space / Work, Energy and Potential
5. Week	Polarization/ Electric flux density (D) and dielectric constant / Relationship between electric flux density and electric field strength (E)
6. Week	Conductors, Dielectrics, and Capacitance /Electrostatics Work, Energy and Potential (Work done by moving a point charge / Conservation of the electrostatic field / Electric potential (V) between two points / Potential of a point charge
7. Week	Mid- term exam
8. Week	Poissons and Laplace Equations
9. Week	Stationary Electrical Currents: Current density and Ohm's law / Continuity equation and Kirchhoff's law of currents / Power dissipated and Joule's law / Continuity equation
10. Week	Resistance Calculation, Resistance Calculation Examples /Introduction to Magnetic Fields, Magnetostatics in Free Space Fundamental Postulates
11. Week	Magnetic Fields and Forces, Biot-Savart law/ Ampere's law.
12. Week	Magnetostatic fields and magnetic materials / Magnetic circuits / Magnetostatic boundary conditions.

13. Week	Inductance and Inductors/ Magnetic energy. Magnetic forces and torques.
14. Week	Magnetic Circuit Examples, Time-Varying Electromagnetic Fields: Faraday's law
15. Week	Time-varying fields and Maxwell's Equations
16. Week	Final Exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Homework / 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

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

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 entrepreneurship, innovation; knowledge about sustainable development		X			
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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Electronics I	**EEE 204**	Spring	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)	Electrical And Electronics Engineering Department Faculty Members						
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.						

SUBJECTS BY WEEKS

Weeks	Subjects
1	**Introduction to Semiconductor Materials – part 1** The Bohr Model, Electrons and Shells, Insulators, Conductors, and Semiconductors, Band Gap, Silicon and Germanium, Current in Semiconductors
2	**Introduction to Semiconductor Materials – part 2** N-Type and P-Type Semiconductors, Majority and Minority Carriers, The PN Junction, Barrier Potential
3	**Diode Applications -part 1**

	Semiconductor diode, Reverse-Bias Condition, forward-bias Condition, Voltage-Current Characteristic of a Diode
4	**Diode Applications -part 2** DC and AC resistance, Diode equivalent circuit, The Zener Diode
5	**Diode Applications -part 3** The Light-Emitting Diode (LED), Schottky diode, The Tunnel Diode, Thyristor, Triac, Diode Configuration
6	**Diode Applications -part 4** Half-wave rectification, Full-wave rectification, Transformer Coupling, Bridge Full-Wave Rectifier Operation, Power Supply Filters and Regulators
7	**Diode Applications -part 5** Clipper, Clamper, Voltage-multiplier Circuits
8	Midterm
9	**Bipolar Junction Transistors – part 1** Bipolar Junction Transistor (BJT), Basic BJT Operation, Transistor Currents
10	**Bipolar Junction Transistors – part 2** Common-base configuration, common-emitter configuration, common-collector configuration
11	**DC Biasing—BJTS** BJT Circuit Analysis, The BJT In Digital Logic Circuits, DC Load Line, Voltage-Divider Bias, Base Bias, Collector-Feedback Bias
12	**BJT Transistor Modeling** Amplification in the AC Domain, The Important Parameters: Zi, Zo, Av, Ai,
13	**Junction Field-Effect Transistors** The JFET, Drain Characteristic Curve, Shockley's equation
14	**JFET Biasing** Fixed-Bias Configuration, Self-Bias Configuration, Depletion-Type MOSFETs, Enhancement-Type MOSFETs
15	**FET Small-Signal Analysis** JFET AC equivalent circuit, MOSFET, The Hybrid equivalent Model,
16	Final Exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Quiz	2	%20
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	0	%0
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%50
Total	18	%100

Contribution of semester Works to success points	17	%50
Contribution of the final exam to success points	1	%50
Total	18	%100

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory	0	0	0
Quiz	2	2	4
Specific practical training	0	0	0
Field activities	0	0	0
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	1	14
Presentation / Seminar Preparation	0	0	0
Project	0	0	0
Homework assignment	0	0	0
Midterms (Study duration)	1	22	22
Final Exam (Study duration)	1	26	26
Total Workload			108
Total Workload/30 hours			3.6
ECTS			5.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.					X
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
An ability to design a			X		

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.					
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.			X		
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal 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 instructions and receiving skills.				X	
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.			X		
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.			X		
Information on business practices such as project management, risk management and change		X			

management; awareness about entrepreneurship and innovation; information on sustainable development.					
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			

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

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	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)	Electrical And Electronics Engineering Department Faculty Members					
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.					

SUBJECTS BY WEEKS

Weeks	Subjects
1	Introduction to Continuous-Time and Discrete-Time Signals, Periodic Signals, Even and Odd Signals

2	Continuous-time and Discrete-Time Complex Exponential and Sinusoidal Signals, The Unit Impulse, and Unit Step Functions
3	Interconnections of Systems, Basic System Properties, Systems with and without Memory, Invertibility and Inverse Systems, Causality, Stability, Time Invariance, Linearity
4	Representation of LTI Systems, Continuous-Time LTI Systems: The Convolution Integral, The Discrete-Time Unit Impulse Response and the Convolution-Sum
5	The Commutative Property, The Distributive Property, The Associative Property, LTI Systems with and without Memory, Invertibility of LTI Systems, Causality for LTI Systems, Stability for LTI Systems, The Unit Step Response of an LTI System
6	Causal LTI Systems Described by Differential and Difference Equations, Block Diagram Representations of First-Order Systems Described by Differential and Difference Equations
7	Fourier Series Representation of Periodic Signals, Properties of the Continuous-Time Fourier Series, Fourier Series Representation of Discrete-Time Periodic Signal
8	Midterm Exam
9	The Continuous-Time Fourier Transform, Properties of the Continuous-Time Fourier Transform
10	The Discrete-Time Fourier Transform, Properties of the Discrete-Time Fourier Transform
11	The Sampling Theorem, Time-Domain Properties of Ideal Frequency-Selective Filters, Time-Domain Properties of Ideal Frequency-Selective Filters
12	The Laplace Transform I
13	The Laplace Transform II
14	The z-Transform
15	Recitation
16	Final Exam

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

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

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.					X
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.					
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		
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.			X		
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal 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 instructions and receiving skills.				X	
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.			X		
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.			X		

Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.		X			
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			

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

COURSE INFORMATION

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

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

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

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

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 entrepreneurship, innovation; knowledge about sustainable development		X			

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

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)	Electrical And Electronics Engineering Department Faculty Members					
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.					

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

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

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

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 interpret results for investigating complex engineering problems or discipline specific research questions				X	
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;				X	

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					
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 entrepreneurship, innovation; knowledge about sustainable development				X	
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

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 313 - Electronics II	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)	Electrical And Electronics Engineering Department Faculty Members					
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.					

SUBJECTS BY WEEKS

Weeks	Subjects
1	Review of Electronics I, BJT and MOSFET, Review of BJT and MOSFET, DC Analysis of BJT and MOSFET, JFET , Basic transistor applications

2	BJT Amplifiers - Multistage amplifiers
3	FET Amplifiers - Multistage amplifiers
4	Amplifier frequency response I
5	Amplifier frequency response II
6	Current Mirror and Active Load
7	Power amplifiers I
8	Midterm Exam.
9	Power amplifiers I
10	Ideal Operational Amplifiers and OP-amp circuits
11	Differential Amplifiers I
12	Differential Amplifiers II
13	Feedback I
14	Feedback II
15	Recitation
16	Final Exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	
Laboratory	0	%0
Quiz	2	%20
Fieldwork	0	
Practice	0	
Homework Assessment	0	
Presentation	0	
Project	0	
Seminar	0	
Mid-term Exams	1	%30
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

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory	0	0	0
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			146
Total Workload/30 hours			4.8
ECTS			5.00

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				X	

information technologies effectively.					
5 Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions			X		
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 entrepreneurship, innovation; knowledge about sustainable development		X			
11 Knowledge about the		X			

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 .					

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

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 331 - Electrical Machines	Fall	3	0	2	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)	Electrical And Electronics Engineering Department Faculty Members					
Course objective	- Students will be able to comprehend the role of electromechanical energy conversion in power systems - Students will be able to understand operation principles, analysis and design of magnetic circuits - Students will be able to understand operation principles and analysis of magnetically coupled circuits Students will be able to comprehend electromechanical energy conversion principles and devices					
Course Content	Electromagnetic materials and circuits, Properties of ferromagnetic materials, Single-phase and three phase transformers, Per Unit System, Principles of electromechanical energy conversion.					
References	1- ELECTRIC MACHINERY FUNDAMENTALS, 5th EDITION, Stephen J. Chapman 2- E. Fitzgerald, Charles Kingsley, Jr., and Stephen D. Umans, Electric Machinery, Sixth Edition, McGraw-Hill, 2003.					
Learning outcomes	**Students who pass the course will be able to:** - Learn the principle of energy conversion, electromechanical energy conversion in the overall energy conversion problems. - Understand magnetic circuits and methods of analysis, flux linkage, inductance, permanent magnet systems. - Know magnetic materials, AC excitation and losses, design of magnetic circuits containing permanent magnets					

	- Learn ideal transformer, practical transformer and the derivation of its equivalent circuits and induced EMF expressions. - Understand performance calculations: voltage regulation and efficiency. - Know transformers in three-phase circuits, short-circuit and open-circuit tests and parameter calculation. - Learn Effects of shape of the air gap on torque expression - Understand induced EMF, electromechanical torque and gross mechanical output power, excitation methods and magnetization characteristics. - Learn the rotational magnetic field and AC machines Phasor diagrams for salient-pole and round rotor synchronous machines (motors and generators)

SUBJECTS BY WEEKS

Weeks	Subjects
1	Introduction to Machinery Principles
2	Properties of Magnetic Materials
3	Single Phase Transformers
4	Single Phase Transformers, Auto transformers
5	Three Phase Transformers
6	Three Phase Transformers
7	Per Unit System
8	Midterm Exam.
9	AC Machinery Fundamentals
10	AC Machinery Fundamentals
11	Three Phase Synchronous Generators
12	Three Phase Synchronous Generators
13	Three Phase Synchronous Motors
14	Three Phase Synchronous Motors
15	Recitation
16	Final Exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	
Laboratory	14	%20
Quiz	2	

Fieldwork	0	
Practice	0	
Homework Assessment	2	%20
Presentation	0	
Project	0	
Seminar	0	
Mid-term Exams	1	%20
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

WORKLOAD AND ECTS CALCULATION

Activities	**Number**	**Duration (hour)**	**Total Workload**
Course Duration (x14)	14	3	42
Laboratory	14	2	28
Quiz			
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	2	5	10
Midterms (Study duration)	1	26	26
Final Exam (Study duration)	1	30	30
Total Workload			164
Total Workload/30 hours			5.4
ECTS			5.00

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					X

pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.					
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 interpret results for investigating complex engineering problems or discipline specific research questions			X		
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				X	

intelligible instructions					
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 entrepreneurship, innovation; knowledge about sustainable development		X			
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

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 321- Digital Signal Processing	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)	Electrical And Electronics Engineering Department Faculty Members					
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).					

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

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	
Laboratory	0	
Quiz	2	%15
Fieldwork	0	
Practice	0	
Homework Assessment	2	%15
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

WORKLOAD AND ECTS CALCULATION

Activities	**Number**	**Duration (hour)**	**Total Workload**
Course Duration (x14)	14	3	42
Laboratory			
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	2	5	10
Midterms (Study duration)	1	22	22
Final Exam (Study duration)	1	26	26
Total Workload			130
Total Workload/30 hours			4.3
ECTS			5.00

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			X		

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.					
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 interpret results for investigating complex engineering problems or discipline specific research questions			X		
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;			X		

knowledge on standards used in engineering practice					
10 Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development		X			
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

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 315 - Electronics Lab	Fall	2	0	0	1	2
Prerequisites	None					
Course Language	English					
Course Type	Compulsory					
Mode of Delivery (face to face,distance learning)	Face to face					
Learning and teaching strategies	Laboratory assessments					
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members					
Course objective	Acquire necessary skills to use electronic measuring instruments and measurement techniques, to teach some important practical features and practical values of electronic components, to understand and analyze some basic diode and transistor circuits by measurements.					
Course Content	Diode I-V Characteristics, Half-Wave Rectifier, Full-Wave Rectifier, DC Biasing of a BJT and Active Region Verification, RC-Coupled BJT Amplifier, Common-Emitter BJT Amplifier, Mosfet Amplifiers, OPAMPS, Filters					
References	1. Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory; Prentice Hall,2012. 2. Thomas L. Floyd, Electronic Devices Conventional Current Version Tenth Edition, Pearson Education, Inc., 2018					
Learning outcomes	After taking this course students will be able to; 1. Perform lab experiments 2. Understand and analyze basic diode and transistor circuits					

SUBJECTS BY WEEKS

Weeks	Subjects
1	Registrations and hands-on with laboratory equipment
2	Diode circuits
3	DC Biasing of a BJT
4	BJT Amplifier - 1

5	BJT Amplifier - 2
6	RC-Coupled BJT Amplifier
7	Characterisation of MOSFET
8	MOSFET Amplifier - 1
9	MOSFET Amplifier - 2
10	Applications of OPAMPS - 1
11	Applications of OPAMPS - 2
12	Schmitt Trigger Circuit
13	Oscillator Circuits
14	Active Filters

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	
Laboratory	10	%100
Quiz	0	
Fieldwork	0	
Practice	0	
Homework Assessment	0	
Presentation	0	
Project	0	
Seminar	0	
Mid-term Exams	0	
Final Exam	0	
Total	24	
Contribution of semester Works to success points	24	
Contribution of final exam to success points	0	
Total	24	%100

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	2	28
Laboratory			
Quiz			
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)			
Final Exam (Study duration)			
Total Workload			56
Total Workload/30 hours			56/30
ECTS			2.00

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				X	

information technologies effectively.					
5 Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions			X		
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 entrepreneurship, innovation; knowledge about sustainable development		X			
11 Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary		X			

issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .					

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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Telecommunications II	**EEE302**	Spring	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 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

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

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

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

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 interpret results for investigating complex engineering problems or discipline specific research questions				X	
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 entrepreneurship, innovation; knowledge about sustainable development		X			
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

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)	Electrical And Electronics Engineering Department Faculty Members					
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.					

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	Basic Computer Architecture
8	Midterm Exam
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

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

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

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			X		

as to meet the desired result; ability to apply modern design methods for this purpose.					
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 interpret results for investigating complex engineering problems or discipline specific research questions			X		
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		X			

such as project management, risk management, and change management; awareness in 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

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 304- Control Theory	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)	Electrical And Electronics Engineering Department Faculty Members					
Course objective	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 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					
References	Modern Control Systems, fourteenth edition, Richard C. Dorf Robert H. Bishop, Pearson, 2022 Modern Control Engineering 5th Edition, Katsuhiko Ogata, Prentice Hall, 2010					
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					

SUBJECTS BY WEEKS

Weeks	Subjects
1	Brief History of Automatic Control, Examples of Control Systems, Brief description of system configurations, Control system types
2	Definition of Laplace Transform, Properties of Laplace Transform, Inverse Laplace Transform
3	Properties of Control Systems (LTI), Open-loop Control System, Closed-loop Control System
4	Transfer Function, Modeling in State Space, State-Space Representation of Scalar Differential Equation Systems, Transformation of Mathematical Models with MATLAB
5	The Transfer Function of Linear Systems, Block Diagram Models, Block Diagram Reduction, Cascaded and Parallel Transfer Functions
6	Block Diagram of Multi-Input Systems, Signal-Flow Graph Models, Mason's Rule
7	Mathematical Modeling of Mechanical Systems, Mathematical Modeling of Electrical Systems, Mathematical Modeling of Fluid Systems
8	Midterm Exam
9	First-Order Systems, Second-Order Systems, Transient-Response Analysis with MATLAB
10	Steady-State Errors in Unity-Feedback Control Systems, Learn to calculate the steady-state error for a non-unity feedback system
11	The Concept of Stability, The Routh–Hurwitz Stability Criterion, The Relative Stability of Feedback Control Systems
12	The Root Locus Concept, Root-Locus Plots, The Root Locus Procedure, Parameter Design by the Root Locus Method, Root-Locus Approach to Control-Systems Design
13	Frequency Response Plots, Bode Diagrams, Closed-Loop Frequency Response of Unity-Feedback Systems, Control Systems Design by Frequency-Response Approach
14	Mapping Contours in the s-Plane, The Nyquist Criterion, Relative Stability and the Nyquist Criterion
	P controller, I controller, D controller, PID controller design, Lead Compensation, Lag Compensation, PID Controllers in the Frequency Domain
15	Recitation
16	Final Exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	
Laboratory	14	%10
Quiz	2	%10
Fieldwork	0	
Practice	0	
Homework Assessment	2	%10

Presentation	0	
Project	0	
Seminar	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

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	2	5	10
Midterms (Study duration)	1	22	22
Final Exam (Study duration)	1	26	26
Total Workload			158
Total Workload/30 hours			5.2
ECTS			5.00

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 interpret results for investigating complex engineering problems or discipline specific research questions			X		
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			X		

him/herself					
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 entrepreneurship, innovation; knowledge about sustainable development		X			
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

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)	Electrical And Electronics Engineering Department Faculty Members					
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, 4rd Edition, Prentice Hall, 2018 2. R. C. Gonzalez, R. E. Woods, & S. L. Eddins, Digital Image Processing Using MATLAB, Prentice Hall, 2004 3. A Baskar, Muthaiah Rajappa, Shriram K Vasudevan, and T S Murugesh, Digital Image Processing, CRC Press, 2023.					
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.					

SUBJECTS BY WEEKS

Weeks	Subjects
1	Introduction to Digital Image Processing. Application of Image Processing
2	Image formation, Sensing & Acquisition, Sampling & Quantization,
3	Types of Images, Intensity, Brightness and Contrast
4	Arithmetic Operations
5	Intensity Transformations I
6	Intensity Transformations II
7	Midterm Exam

8	Histogram Stretching, Histogram Clipping
9	Histogram Equalization, Histogram Matching
10	Smoothing Filters, Sharpening Filters
11	Edge Detection, Thresholding
12	Image Segmentation
13	Morphological Image Processing
14	Filtering in Frequency Domain
15	Recitation
16	Final Exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	
Laboratory	0	
Quiz	0	
Fieldwork	0	
Practice	0	
Homework Assessment	3	%20
Presentation	0	
Project	0	
Seminar	0	
Mid-term Exams	1	%30
Final Exam	1	%50
Total	19	%100
Contribution of semester Works to success points	18	%50
Contribution of final exam to success points	1	%50
Total	19	%100

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			4.9
ECTS			5.00

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 interpret results for investigating complex engineering problems or discipline specific research questions			X		
6 Ability to work efficiently in intra-disciplinary and multi-		X			

disciplinary teams; ability to work individually					
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 entrepreneurship, innovation; knowledge about sustainable development		X			
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

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)	Electrical And Electronics Engineering Department Faculty Members					
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					

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

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

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

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				X	

pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.					
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 interpret results for investigating complex engineering problems or discipline specific research questions				X	
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 entrepreneurship, innovation; knowledge about sustainable development			X		
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

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Optical Fiber Communications	**EEE338**	Fall	3	0	2	4	6
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, 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.

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

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

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

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 interpret results for			X		

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;				X	

awareness in 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

COURSE INFORMATION

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

EEE 423- 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)	Electrical And Electronics Engineering Department Faculty Members					
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.

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

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

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

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 interpret results for investigating complex engineering problems or discipline specific research questions				X	
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;				X	

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					
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 entrepreneurship, innovation; knowledge about sustainable development			X		
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

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)	Electrical And Electronics Engineering Department Faculty Members					
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.					

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

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

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

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 interpret results for investigating complex engineering problems or discipline specific research questions				X	
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;				X	

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					
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 entrepreneurship, innovation; knowledge about sustainable development			X		
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

COURSE INFORMATION

Course Name	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
EEE 484 - Power Electronics	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/Distance Learning/Hybrid					
Learning and teaching strategies	Lecturing, discussion and submission.					
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members					
Course objective	To gain knowledge and skills about the design principles and characteristics of semiconductor power switches used in power electronics circuits, design techniques and theories of AC/DC, AC/AC and DC/AC converters.					
Course Content	The operating principles of semiconductor power switches, features and characteristics; Power and harmonic calculations in electrical circuits; AC/DC, DC/AC and AC/AC power electronics converter circuits.					
References	1. Ned Mohan, Tore M. Undeland, William P. Robbins, “Power Electronics”. 2. B. K. Bose, “Power Electronics and AC Drives” 3. B. M. Bird, K. G. King, D. A. G. Pedder “An Introduction to Power Electronics” 4. M. H. Rashid, “Power Electronics – Circuits, Devices and Applications” 5. Lecture notes					
Learning outcomes	**Students who pass the course will be able to:** – Learn knowledge and skills about the design principles of semiconductor power switches. – Learn the characteristics of semiconductor power switches. – Perform to design techniques and theories of AC/DC, AC/AC and DC/AC converters. – Analyze the power and harmonic calculations in electrical circuits – Apply the single phase semi and full controlled rectifiers. operation principles, control circuits and some applications.					

	– Learn the three phase semi and full controlled rectifiers. operation principles, control circuits and some applications. – Perform the single phase semi and full controlled inverters. Analyze the the three phase semi and full controlled inverters, operation principles, control circuits and some applications.

SUBJECTS BY WEEKS

Weeks	Subjects
1. Week	Introduction to Power Electronics, Basic Definitions, Classification of Power Electronics Converter.
2. Week	Semiconductor switching elements (power diodes, thyristor, transistor, etc.)
3. Week	Thyristor Type Power Semiconductor Switches Thyristors(SCRs), GTOs and Triacs, The Structure, Characteristics, and Triggering Circuits, Thyristor Commutation Techniques
4. Week	Power Semiconductor Switches Power Transistors(BJTs), Power MOSFETs, and IGBTs, The Structure, Characteristics, and Gate Drive Circuits
5. Week	Protection of Power Semiconductor Switches, Snubber Circuits and Isolation Elements
6. Week	AC/DC Rectifiers, Performance Parameters. Uncontrolled Single Phase and Three Phase Rectifiers. Operation Principles and Applications
7. Week	Single Phase Semi and Full Controlled Rectifiers. Operation Principles, Control Circuits and Some Applications
8. Week	Mid-term Exam
9. Week	Three Phase Semi Controlled Rectifiers. Operation Principles, Control Circuits and Some Applications.
10. Week	Three Phase Full Controlled Rectifiers. Operation Principles, Control Circuits and Some Applications.
11. Week	Basic Operation Principles and Applications of DC/AC Inverters

12. Week	Single Phase DC/AC Inverters, Basic Operation Principles and Applications.
13. Week	Single Phase Semi-Controlled inverters. Operation Principles, Control Circuits and Some Applications
14. Week	Three Phase Full Controlled inverters. Operation Principles, Control Circuits and Some Applications.
15. Week	Review
16. Week	Final exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%
Quiz	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework	2	%20
Presentation	0	%0
Project	1	%20
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%30
Total	19	%100
Contribution of semester Works to success points	18	%60
Contribution of final exam to success points	1	%50
Total	19	%100

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	2	5	10
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			126
Total Workload/30 hours			4.2
ECTS			5.00

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,				X	

gather data, analyze and 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 entrepreneurship, innovation; knowledge about sustainable development			X		
11 Knowledge about the global and social effects of engineering practices on health, environment, and				X	

safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .					

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