BİLGİSAYAR MÜHENDİSLİĞİ BÖLÜMÜ

MÜFREDAT EL KİTABI

ANKARA,2026

ANKARA BİLİM ÜNİVERSİTESİ

COMPUTER ENGINEERING DEPARTMENT

CURRICULUM HANDBOOK

ANKARA,2026

İçindekiler

ANKARA BİLİM ÜNİVERSİTESİ
BİLGİSAYAR MÜHENDİSLİĞİ BÖLÜMÜ

2020-2021 yılı Güz döneminde eğitim-öğretim hayatına başlayan Bilgisayar Mühendisliği Bölümü, alanında yetkin ve mesleğinin gerekliliklerini özümsemiş Mühendisler yetiştirmeyi amaçlamaktadır.

Misyon

- Temel mühendislik bilgisi ve güncel teknolojilerle donatılmış, yazılım, donanım ve sistem tasarımı konularında yetkin, analitik düşünebilen ve problem çözme becerisi yüksek bilgisayar mühendisleri yetiştirmek,
- Takım çalışmasına uyumlu, etkili iletişim kurabilen, mesleki etik ilkelere bağlı, sorumluluk sahibi bireyler kazandırmak,
- Öğrencilerimize uygulamalı eğitim, proje ve staj fırsatları sunarak, mezuniyet sonrası kamu, özel sektör ve girişimcilik alanlarında güçlü bir kariyer temeli oluşturmalarını sağlamak,
- Yerel ihtiyaçları gözeterek, topluma katkı sunacak teknoloji tabanlı çözümler geliştirmeye açık, yenilikçi ve üretken bireyler yetiştirmek.

Vizyon

Bilgi ve iletişim teknolojilerindeki hızlı gelişmeleri, sektörel ihtiyaçları ve sürdürülebilirlik yaklaşımını harmanlayan; çevreye duyarlı, yenilikçi ve çözüm odaklı mühendisler yetiştiren, araştırma-geliştirme ve sanayi iş birlikleriyle öne çıkan, ulusal ve uluslararası düzeyde tanınan bir bölüm olmaktır.

ANKARA SCIENCE UNIVERSITY
DEPARTMENT OF COMPUTER ENGINEERING

Beginning its education in 2020-2021 Fall Term, the Department of Computer Engineering aims to raise engineers who are competent in fields of Computer Engineering and who have internalized the requirements of their profession.

Mission

- To train computer engineers equipped with fundamental engineering knowledge and current technologies, competent in software, hardware, and system design, capable of analytical thinking, and possessing strong problem-solving skills,
- To develop individuals who are team players, effective communicators, committed to professional ethics, and responsible,
- To provide our students with practical training, projects, and internship opportunities, enabling them to build a strong career foundation in the public sector, private sector, and entrepreneurship after graduation,
- To cultivate innovative and productive individuals who are open to developing technology-based solutions that contribute to society, taking local needs into account

Vision

To be a nationally and internationally recognized department that blends rapid developments in information and communication technologies, sectoral needs, and a sustainability approach; trains environmentally conscious, innovative, and solution-oriented engineers; and stands out through research and development and industry collaborations.

Cirriculum

I. SEMESTER

Code	Course Name	T	U	K	ECTS
CENG 101	Algorithms and Programming with Java I	3	2	4	6
OHS 101	Occupational Health and Safety I	1	0	1	1
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 and 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
	Open Course I	0	0	0	0
Term Credit		**20**	**4**	**22**	**30**

II. SEMESTER

Code	Course Name	T	U	K	ECTS
CENG 102	Algorithms and Programming with Java II	3	4	5	8
OHS 102	Occupational Health and Safety II	1	0	1	1
ENG 102	Academic English II	2	0	2	2
MATH 102	Calculus II	4	0	4	6
PHY 102	Physics II	3	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
	Non-Dept. Elective I	3	0	3	3
	Open Course II	0	0	0	0
Term Credit		**20**	**6**	**23**	**30**

III. SEMESTER

Code	Course Name	T	U	K	ECTS
EEE 203	Digital Design	3	2	4	5
EEE 281	Electrical Circuits for Comp. Eng.	3	2	4	5
CENG 213	Data Structures and Algorithms	3	0	3	5
CENG 223	Discrete and Combinatorial Math.	3	0	3	5
CENG 241	Programming Languages	3	0	3	6
ENG 201	Academic English III	2	0	2	2
	Non-Departmental Elective II	3	0	3	3
Term Credit		**20**	**4**	**22**	**31**

IV. SEMESTER

Code	Course Name	T	U	K	ECTS
CENG 214	Algorithms II	3	0	3	6
CENG 256	Formal Languages and Automata Theory	3	0	3	6
MATH 224	Linear Algebra & Differential Equations	3	0	3	5

Code	Course Name	T	U	K	ECTS
MATH 206	Probability Theory and Statistics	3	0	3	5
SENG 264	Intro. to AI & Machine Learning	3	0	3	6
ENG 202	Academic English IV	2	0	2	2
Term Credit		**17**	**0**	**17**	**30**

V. SEMESTER

Code	Course Name	T	U	K	ECTS
CENG 301	Operating Systems	3	0	3	6
CENG 351	Database Management Systems	3	0	3	6
SENG 321	Software Engineering	3	0	3	6
CENG 361	Web Design and Programming	3	0	3	5
ENG 301	Academic English V	2	0	2	2
	Technical Elective I	3	0	3	5
Term Credit		**17**	**0**	**17**	**30**

VI. SEMESTER

Code	Course Name	T	U	K	ECTS
CENG 332	Computer Architecture	3	2	4	5
CENG 336	Computer Networks	3	0	4	6
SENG 324	Software Design Patterns	3	0	3	6
CENG 384	Intro. to Signals Processing for Comp. Engineers	3	0	3	5
ENG 302	Academic English VI	2	0	2	2
	Technical Elective II	3	0	3	5
Term Credit		**17**	**2**	**19**	**29**

VII. SEMESTER

Code	Course Name	T	U	K	ECTS
CENG 491	Graduation Project I	3	2	4	5
CCE 401	Critical Thinking, Creativity and Entrepreneurship	2	0	2	2
	Technical Elective III	3	0	3	5

Code	Course Name	T	U	K	ECTS
	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
Term Credit		**20**	**2**	**21**	**30**

VIII. SEMESTER

Code	Course Name	T	U	K	ECTS
CENG 492	Graduation Project II	3	2	4	5
CENG 490	Long Term Practice	0	16	8	25
Term Loan		**3**	**18**	**12**	**30**

Grand Totals

TOTAL CREDIT	134
TOTAL ECTS	240

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

CENG 101 - Algorithms and Programming with Java-I

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)	Faruk Tokdemir Asst. Prof..Dr, Hasan Karaaslan Asst. Prof. Dr.						
Course objective	This course aims to provide students with a foundational understanding of computers and core programming concepts, while fostering the development of basic computational thinking skills, such as algorithmic thinking. It introduces students to fundamental concepts and terminology used in computer programming and enables them to understand and apply predefined classes and objects effectively. Students will learn to use an integrated development environment (IDE) to design, write, and test code in the Java programming language. Additionally, the course focuses on the						

	correct use of data types, decision structures, arrays, conditionals, and loops, building the essential skills needed to solve problems through programming.
Course Content	1. Introduction to computers and Java programming 2. Fundamental data types 3. Decisions 4. Loops 5. Methods 6. Arrays 7. ArrayLists
References	1. Big Java: Late Objects, 2nd Edition by Cay S. Horstmann, ISBN: 978-1-119-32107-1 October 2016 WILEY publications 2. Computer Usage : BlueJ Link to BlueJ : http://www.bluej.org/ 3. Link to Oracle JDK and JDK documentation: http://www.oracle.com/technetwork/java/javase/downloads/index.html 4. Java How to Program, Late Objects, Global Edition, 11th edition Published by Pearson (September 11, 2019) Paul Deitel Deitel & Associates, Inc.Harvey M. Deitel Deitel & Associates, Inc. ISBN-13: 9781292273730 5. Java Programming by Joyce Farrell ISBN-13: 9780357673423 CENGAGE publication 10th Edition | Copyright 2023 6. Introduction to Programming with Java: A Problem Solving Approach, 3rd Edition, 2021 ISBN10: 1260250202 | ISBN13: 9781260250206 By John Dean and Ray Dean © 2021
Learning outcomes	After taking this course students will be able to; 1. Understand the basic knowledge of computers, topics of computer engineering and programming with Java 2. Understand the basic concepts of computer organization and its peripherals 3. Develop programs in Java in order to solve beginner level problems 4. Have gained the necessary knowledge to continue with studying further Java course subjects

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Anatomy of a computer, Java programming environment, BlueJ, Java SDK, first program,
2. Week	programming errors, algorithms, pseudocode and flowchart, examples.
3. Week	Data types, variables, operators, precedence, I/O, assignment statement, constant declarations, number system, conversions, examples.
4. Week	formatted output, Java API classes, steps of solving a problem, string operations, examples. Input and Output using command line and message boxes. Examples
5. Week	Boolean data type, if statement, one and two ways if, flowchart representation, boolean operators, precedence, expressions, examples,
6. Week	if-else chain, flowchart representation, nested if, switch statement, enumerated types, tracing examples.
7. Week	Why looping?, while loop, loop variables, sentinel values, infinite loop, common errors,
8. Week	Midterm Exam
9. Week	for loop, various forms of for loop, examples, convert a while loop to a for loop, examples,
10. Week	do-while loop, sentinel values, examples, nested loops, text files (from ch7), GUI classes, drawing shapes
11. Week	Need for methods, black box analogy, method layout, parameter passing, return types, examples,
12. Week	(continued) methods without return values, variable scopes, stepwise refinement, documentation tags, examples.
13. Week	Why arrays?, declaration, one dimensional arrays, array indexes, array bounds, length property, partially filled arrays, examples, enhanced for loop (for-each loop)
14. Week	common array algorithms, array arguments, pass by reference, methods that return an array, two dimensional arrays, ragged arrays, ArrayList class, examples.

15. Week	Lab Final Exam, Final Exam

Course Requirements

The students are expected to successful in Midterm and by making practices in the lab, must gain the ability of problem solving in computers via Java programming language

Assessment Method

Description	**%**	**Due date**
Midterm Exam	**35%**	
Lab Final Exam	**25%**	
Final Exam	**40%**	

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	10	%0
Application	0	%0
Fieldwork	0	%0
Practice	10	%0
Homework Assessment	0	%0
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%35
Lab Final Exam	1	%25
Final Exam	1	%40
Total	27	%100
Contribution of semester Works to success points	3	%60
Contribution of final exam to success points	1	%40
Total	27	%100

Form VIb (English): 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	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterm (Study duration)	1	10	10
Lab Final Exam	1	10	10
Final Exam (Study duration)	1	15	15
Total Workload			171
Total Workload/30 hours			5.70
ECTS			6.00

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAMOUTCOMES	1	a		x	x	x		
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
ALL ENGINEERING DEPARTMENTS

MATH 101 - Calculus I

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						
Learning and Teaching strategies	Lecturing, discussion, and submission						
Instructor(s)	Dr. Seher Fişekci Par						
Course objective	The main goals of the course are to develop and strengthen the students' problem-solving skills and to teach them to read, write, and think in the language of mathematics. Students should be able to apply the tools of calculus to a variety of problem situations.						
Course content	The concepts of Limit and Continuity. The Derivative, Applications of the Derivative. Transcendental functions. Critical Points. Asymptotes. Curve sketching. The Integration, Fundamental Theorem of Calculus. Techniques of Integration, Applications of the Integral.						
References	1. Calculus (Metric Version), 8th (or 7th) Edition, by James Stewart 2. Calculus, 14th Edition, by George B. Thomas (Supplementary Book)						
Learning Outcomes	Upon successful completion of this course, a student will be able to: 1. Recall definitions, statements of theorems, certain examples and counterexamples pertaining to functions of one variable. 2. Calculate limits and continuity for functions of one variable. 3. Calculate the derivatives of elementary and transcendental functions of one variable, tangent line, the chain rule, and implicit differentiation.						

	4. Compute the integrals of elementary and transcendental functions of one variable, method of substitution, integration by parts, powers and products of trigonometric functions, trigonometric substitution, and partial fractions. 5. Solve problems of related rates, minimum-maximum, linear approximations, graphing functions, length of a curve, planar area, and volume.

Subjects by weeks

Weeks	**Subjects**
1. week	Appendix D: Trigonometry, The Limit of a Function, Calculating Limits using the Limit Laws
2. week	Limits at Infinity; Horizontal Asymptotes Continuity
3.week	Derivatives and Rates of Change The Derivative as a Function Differentiation Formulas
4.week	Derivatives of Trigonometric Functions The Chain Rule Implicit Differentiation
5.week	Related Rates Linear Approximations and Differentials Inverse Functions Exponential Functions and Their Derivatives
6.week	Logarithmic Functions Derivatives of Logarithmic Functions Inverse Trigonometric Functions, Hyperbolic Functions
7.week	Indeterminate Forms and l'Hospital's rule Maximum and Minimum Values The Mean Value Theorem How Derivatives Affect the Shape of a Graph Summary of Curve Sketching
8.week	**Midterm Exam**
9.week	Optimization problems Antiderivatives
10.week	Areas and Distances The Definite Integral The Fundamental Theorem of Calculus
11.week	Indefinite Integrals and the Net Change Theorem The Substitution Rule

	Integration by Parts
12.week	Trigonometric Integrals Trigonometric Substitution
13.week	Integration of Rational Functions by Partial Fractions Improper Integrals
14.week	Areas Between Curves Volumes Volumes by Cylindrical Shells
15.week	Average Value of a Function Arc length Area of a Surface of Revolution
16.week	**Final Exam**

Assessment Method

Semester Works	**Number**	**Contribution**
Attendance	14	0%
Laboratory	0	0%
Application	0	0%
Fieldwork	0	0%
Practice	14	0%
Homework Assessment	0	0%
Quiz	0	0%
Presentation	0	0%
Project	0	0%
Seminar	0	0%
Mid-term Exam(s)	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	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	0	0	0
Quiz	0	0	0
Midterms (Study duration)	1	17	17
Final Exam (Study duration)	1	23	23
Total Workload	180		
Total Workload/30 hours	6		
ECTS	6		

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUT COMES	1	a	X	X	X	X	X	
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						

	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE

PHY 101 - Physics I

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Phsics I	PHY101	Fall	3	0	0	3	5
Prerequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of	Face to face						
Learning and teaching strategies	Lecturing, discussion and submission.						
Instructor (s)	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 defining and solving problems.						
Course Content	Basic information about the concepts of nature of matter, mechanics, kinetics and dynamics						
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 concepts of mechanics, kinetics and dynamics 2. Apply the topics of mechanics to their own engineering science 3. Improve the ability of student's solution perspective for different kinds of new problems 4. Modeling a new problem related with the concepts of mechanics and interpret the results 5. The ability to analyze a problem graphically						

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Physics and measurement
2. Week	Motion in one dimension
3. Week	Vectors
4. Week	Motion in two dimensions
5. Week	The laws of motion
6. Week	Circular motion and other applications of Newton's laws
7. Week	Circular motion and other applications of Newton's laws
	Midterm Exam
8. Week	Energy and energy transfer
9. Week	Energy and energy transfer
10. Week	Potential energy
11. Week	Linear momentum and collisions
12. Week	Rotation of a rigid object and about a fixed axis
13. Week	Rotation of a rigid object and about a fixed axis
14. Week	Angular momentum

Assessment Method

Semester Works	Number	Contribution
Attendance	14	%5
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	0	%0
Presentation	0	%0
Quiz	0	%10
Seminar	0	%0
Mid-term Exams	1	%40
Final Exam	1	%45
Total	16	%100
Contribution of semester Works to success points	15	%55
Contribution of final exam to success points	1	%45
Total	16	%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)	18	5	90
Presentation / Seminar Preparation			
Project			
Homework assignment	9	5	45
Midterms (Study duration)	1	8	8
Final Exam (Study duration)	1	12	12
Total Workload			197
Total Workload/30 hours			6.56
ECTS			5

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUT COMES	1	a	X	X	X	x	x	
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a	x	x	x	x	x	
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
PHY 103 SYLLABUS

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	None						
Course Language	English						
Course Type	Compulsory						
Mode of	Face to face						
Learning and teaching strategies	Application Analyze Reporting						
Instructor (s)	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

Form IVb (English): Experiment Names

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

Form VIb (English): 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

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUT COMES	1	a	X	X	X			
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a	x	x	x			
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
PHY 103 SYLLABUS

PHY 103 - Physics I Lab

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	None						
Course Language	English						
Course Type	Compulsory						
Mode of	Face to face						
Learning and teaching strategies	Application Analyze Reporting						
Instructor (s)	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

Form IVb (English): Experiment Names

Weeks	Experiment Names
1. Week	Preparation
14. Week	Significant Figures and Measurement
15. Week	Significant Figures and Measurement
16. Week	Calculating Gravitational Acceleration
17. Week	Calculating Gravitational Acceleration
18. Week	Hooke's Law
19. Week	Hooke's Law
20. Week	Newton's Second Law
21. Week	Newton's Second Law
22. Week	Parallel and Series Connections of Springs
23. Week	Parallel and Series Connections of Springs
24. Week	Collisions in One Dimension
25. 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

Form VIb (English): 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

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUT COMES	1	a	X	X	X			
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a	x	x	x			
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
COURSE INFORMATION

BIO101 - Molecular biology and Biochemistry

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)	13	3	39
Presentation / Seminar Preparation	0	0	0
Project	0	0	0
Homework assignment	0	0	0
Quiz	0	0	0
Midterms (Study duration)	1	24	24
Final Exam (Study duration)	1	30	40
Total Workload	145		
Total Workload/30 hours	4.83		
ECTS	5		

Program Learning Outcomes - Course Learning Outcomes Matrix

			COURSE LEARNING OUTCOMES

			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUTCOMES	1	a	X	X	X			
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a	X					
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

CENG 102 - Algorithms and Programming with Java-II

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	Fall	3	0	4	5	8
Prerequisites	CENG 101						
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)	Faruk Tokdemir Asst. Prof..Dr, Hasan Karaaslan Asst. Prof. Dr.						
Course objective	**This course aims to provide** students with continued learning in the Java programming language by introducing more advanced features and semantics. It emphasizes proficient programming skills in Java, along with appropriate techniques for analysis, design, development, and debugging. Students will gain a deeper understanding of core object-oriented concepts such as classes, objects, and encapsulation, and will apply object-oriented design principles to build complex programs in a systematic and structured manner. The course also introduces common user-interface components and their application to real-world problems. In addition, students will explore several						

	sorting and searching algorithms and learn how to estimate and compare their performance to select the most efficient approach for a given problem.
Course Content	1. Objects and Classes 2. Inheritance and Interface 3. Input/Output and Exception Handling 3. Graphical User Interfaces 4. Advanced Graphical User Interface 5. Object Oriented Design 6. Recursion 7. Sorting and Searching 8. Java Collections Framework
References	1. Big Java: Late Objects, 2nd Edition by Cay S. Horstmann, ISBN: 978-1-119-32107-1 October 2016 WILEY publications 2. Computer Usage : BlueJ Link to BlueJ : http://www.bluej.org/ 3. Link to Oracle JDK and JDK documentation: http://www.oracle.com/technetwork/java/javase/downloads/index.html 4. Java How to Program, Late Objects, Global Edition, 11th edition Published by Pearson (September 11, 2019) Paul Deitel Deitel & Associates, Inc.Harvey M. Deitel Deitel & Associates, Inc. ISBN-13: 9781292273730 5. Java Programming by Joyce Farrell ISBN-13: 9780357673423 CENGAGE publication 10th Edition | Copyright 2023 6. Introduction to Programming with Java: A Problem Solving Approach, 3rd Edition, 2021 ISBN10: 1260250202 | ISBN13: 9781260250206 By John Dean and Ray Dean © 2021
Learning outcomes	After taking this course students will be able to; 1. Solve real problems pertaining to mathematics, modeling and computation with the basic knowledge of computer literacy, design and programming skills 2. Employ object-oriented design and development through Implementation of classes, inheritance, interfaces, methodology and understand the concepts of classes, objects and encapsulation 3. Become familiar with common user-interface problems and apply related solutions to real world problems

	4. Have understood several sorting and searching algorithms, estimate and compare space and time limitations of different algorithms

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	The concepts of classes, objects, and encapsulation, public interface of a class
2. Week	implementing instance method, constructors, design, implement and test classes , static variables and static methods.
3. Week	Inheritance and inheritance hierarchies, implementation of subclasses that inherit and override superclass methods,
4. Week	the concept of polymorphism.
5. Week	Common superclass Object and its methods and working with interface types.
6. Week	Read and Write text files, text input and output. Process command line arguments. Exception handling, throwing and catching exceptions, some examples and programming tips.
7. Week	Implementation programs that propagate checked exceptions and handling input errors.
8. Week	Midterm Exam
9. Week	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.
10. Week	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.
11. Week	Inheritance, aggregation, and dependency relationships between classes using UML class diagrams. Object oriented design techniques to building complex programs. Package usage to organize programs
12. Week	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

13. Week	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
14. Week	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	Lab Final Exam, Final Exam

Course Requirements

The students are expected to successful in Midterm and by making practices in the lab, must gain the ability of problem solving in computers via Java programming language

Assessment Method

Description	**%**	**Due date**
Midterm Exam	**35%**	
Lab Final Exam	**25%**	
Final Exam	**40%**	

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	12	%0
Application	0	%0
Fieldwork	0	%0
Practice	12	%0
Homework Assessment	0	%0
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%35
Lab Final Exam	1	%25
Final Exam	1	%40
Total	29	%100
Contribution of semester Works to success points	3	%60
Contribution of final exam to success points	1	%40
Total	29	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory	12	4	48
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	8	112
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterm (Study duration)	1	10	10
Lab Final Exam	1	10	10
Final Exam (Study duration)	1	15	15
Total Workload			237
Total Workload/30 hours			7.9
ECTS			8.00

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

			COURSE LEARNING OUTCOMES			
			LO1	LO2	LO3	LO4
PROGRAMOUTCOMES	1	a	x	x	x	x
		b				
		c				
	2	a				
		b				
		c				
	3	a				
		b				
	4	a				
		b				
		c				
	5	a				
		b				
	6	a				
		b				
	7	a				
		b				
	8	a				
		b				
	9	a				
		b				
	10	a				
		b				
	11	a				
		b				
		c				
	12					
	13	a				
		b				
	14	a				
		b				
		c				
	15					

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
ALL ENGINEERING DEPARTMENTS

MATH 102 - Calculus II

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	Math 101						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery	Face to face						
Learning and Teaching strategies	Lecturing, discussion, and submission						
Instructor(s)	Dr. Seher Fişekci 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. Compute limits, derivatives and integrals of vector functions. 6. Compute limits, derivatives and integrals of vector functions and evaluate limits, partial derivatives, directional derivatives, multiple integrals of multivariable functions and 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%
Quiz	0	0%
Presentation	0	0%
Project	0	0%
Seminar	0	0%
Mid-term Exam(s)	1	40%
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	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	1	5	5
Quiz	0	0	0
Midterms (Study duration)	1	15	15
Final Exam (Study duration)	1	20	20
Total Workload	180		
Total Workload/30 hours	6		

ECTS	6

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUT COMES	1	a	X	X	X	X	X	X
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE

PHY 102 - Physics II

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Physics II	PHY102	Spring	3	0	0	3	5
Prerequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of	Face to face						
Learning and teaching strategies	Lecturing, discussion and submission.						
Instructor (s)	Dr. Vedat TANRIVERDİ						
Course objective	Upon the successful completion of this course, students will establish the relationship between electricity, magnetism and engineering. This includes to provide students the concepts of electricity and magnetism with defining and solving problems.						
Course Content	Basic concepts of electricity and magnetism such as circuits, Gauss's Law, Faraday's Law						
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 concepts of electricity and magnetism 2. Apply the topics of electromagnetism to their own engineering science 3. Improve the ability of student's solution perspective for different kinds of new problems 4. Modelling a new problem related with the concepts of electromagnetism and interpret the results 5. Enabling interactive thinking with other fields of sciences such as electric and electronics engineering						

Course Schedule

Weeks	Subjects
1. Week	Electric fields
2. Week	Electric fields
3. Week	Gauss's law
4. Week	Electric potential
5. Week	Electric potential
6. Week	Capacitance and dielectrics
7. Week	Current and resistance
	Midterm Exam
8. Week	Current and resistance
9. Week	Direct current circuits
10. Week	Magnetic fields
11. Week	Sources of magnetic fields
12. Week	Sources of magnetic fields
13. Week	Faraday's law
14. Week	Inductance

Assessment Method

Semester Works	Number	Contribution
Attendance	14	%5
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	0	%0
Presentation	0	%0
Quiz	0	%10
Seminar	0	%0
Mid-term Exams	1	%40
Final Exam	1	%45
Total	16	%100
Contribution of semester Works to success points	15	%55
Contribution of final exam to success points	1	%45
Total	16	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	18	5	90
Presentation / Seminar Preparation			
Project			
Homework assignment	9	5	45
Midterms (Study duration)	1	8	8
Final Exam (Study duration)	1	12	12
Total Workload			197
Total Workload/30 hours			6.56
ECTS			5.00

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUT COMES	1	a	X	X	X	x	x	
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a	x	x	x	x	x	
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE

PHY 104 - Physics II Lab

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	None						
Course Language	English						
Course Type	Compulsory						
Mode of	Face to face						
Learning and teaching strategies	Lecturing, discussion and submission.						
Instructor (s)	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.						
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 6. Designing an experiment						

Course Schedule

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

Assessment Method

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

Form VIb (English): 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

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUT COMES	1	a	X	X	X	x	x	
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b	X	X	X	x	x	
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a	x	x	x	x	x	
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

EEE 203 - Digital Design

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/Hybrid						
Learning and teaching strategies	Lectures, Experiments, Problem Solving.						
Instructor (s)	Assist. Prof. Dr. Hamed KAGHAZCHI						
Course objective	The aim of this course is to teach students the fundamental building blocks and operating principles of digital systems, including the functionality, applications, and design techniques of combinational and sequential circuits, registers and memories, and programmable logic devices. It also aims to develop students' ability to apply digital system components to system design and to enhance their proficiency in computer-aided design tools. Through laboratory experiments, students will gain hands-on experience and practical insight into digital system concepts.						
Course Content	1- Introduction to Digital Systems 2- Binary, Octal, and Hexadecimal Numbers 3- Complements of Numbers and Binary Codes 4- Digital Logic Gates 5- Principle of Boolean Algebra and Boolean Functions 6- Gate-Level Minimization 7- Analysis and Design of Combinational Circuits 8- Analysis and Design of Sequential Circuits 9- Registers and Counters 10- Memory (RAM, ROM)						
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; 1- Ability to convert a number from one numeral system to another. 2- Understanding the operating principles of logic gates. 3- Understanding the operating principles of encoders, decoders, and multiplexers. 4- Ability to analyze and design combinational circuits. 5- Ability to analyze and design sequential circuits. 6- Understand running principles of synchronous sequential circuits with flip-flops, shift registers and counters and memory.

Subjects by weeks

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

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

PROGRAMOUTCOMES - THE COURSE LEARNING OUTCOMES MATRIX

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUT COMES	1	a						
		b						
		c						
	2	a						
		b						
		c						
	3	a				x	x	
		b	x			x	x	x
	4	a		x	x	x	x	x
		b		x	x	x	x	x
		c				x	x	x
	5	a						
		b				x		
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a						
		b						
		c						
	15			x	x	x		

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FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

COURSE INFORMATION

EEE 281- Electric & Electronics Circuits for Comp. Eng

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Electric & Electronics Circuits for Comp. Eng.	EEE281	Fall	3	0	2	4	5
Prerequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of delivery	Face to face/Distance Education/Hybrid						
Learning and teaching strategies	Lectures, Experiments, Problem Solving.						
Instructor (s)	Electrical And Electronics Engineering Department Faculty Members						
Course objective	This course aims to equip students with knowledge of electricity, electrical safety, and fundamental concepts used in electrical installations. Students will learn key electrical quantities such as current, voltage, resistance, power, frequency, and energy. The course also focuses on the analysis of resistive circuits, RL, RC, and RLC circuits. Additionally, this course introduces fundamentals of electronics by covering the following topics; Principles of Semiconductor, Modeling of microelectronic devices, and basic microelectronic circuit, simple diode circuits, rectifiers and voltage regulators, and Introduction to BJT and JFET amplifiers.						
Learning outcomes	After taking this course students will be able to: 1- Acquiring the ability to understand, model, and utilize electrical and electronics circuit components. 2- Developing the ability to analyze and solve electrical circuits in the time domain. 3- Acquiring basic measurement skills in electrical circuits. 4- Understanding the characteristics of operational amplifiers and their applications in circuits. 5- Ability to apply the fundamentals of semiconductor materials and physics in engineering applications. 6- To understand the operation of BJT and JFET and perform AC/DC analysis.						

Course Content	1- Review of current, voltage and resistance. 2- Ohm's law, power and energy. 3- Series- parallel DC circuits. 4- Methods of DC circuit analysis; mesh and nodal analysis. 5- DC network theorems. 6- Operational Amplifiers. 7- Magnetic circuits and inductors and Capacitors. 8- First Order Circuits. 9- Second Order Circuits. 10- AC Circuits. 11- Semiconductor diode. 12- BJT and JFET
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	Dependent and Independent sources, Series-parallel DC circuits.
3. Week	Methods of DC circuit analysis; mesh and nodal analysis.
4. Week	Linearity, Superposition, and Source Transformation, Thevenin's Theorem and Norton's Theorem
5. Week	Operational amplifiers.
6. Week	Capacitors, Magnetic circuits and inductors
7. Week	First Order Circuits, Source-free RL and RC Circuits, Step Response RL and RC Circuits.

8. Week	Mid- term exam
9. Week	Second Order Circuits. RLC Circuits
10. Week	Sinusoids and Phasors, AC Circuits, Introduction to steady–state Analysis
11. Week	Introduction to Semiconductor Materials, N-Type and P-Type Semiconductors, Majority and Minority Carriers, The PN Junction, Barrier Potential
12. Week	Semiconductor diode, Reverse Bias Condition, forward-bias Condition, Voltage-Current Characteristic of a Diode, Diode Applications.
13. Week	Bipolar Junction Transistors, Junction Field-Effect Transistors
14. Week	Analysis of electric and electronic circuits using Proteus.
15. Week	Final Exam.

ASSESMENT METHOD

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	12	%10
Quiz	2	%20
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	30	%100
Contribution of semester Works to success points	29	%60
Contribution of final exam to success points	1	%40
Total	30	%100

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Work Load
Course Duration (x14)	14	3	42
Laboratory	12	2	24
Quiz	2	2	4
Specific practical training			
Take Home Exam			
Study Hours Out of Class (Preliminary work, reinforcement, ect)	14	2	28
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	20	20
Final Exam (Study duration)	1	25	30
Total Workload	44	54	148

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUT COMES	1	a	x	x	x	x	x	x
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a						
		b						
		c						
	15							

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COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Discrete Mathematics	CENG 223	Fall	3	0	0	3	5
Prerequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery	Face to face/Distance Learning/Hybrid						
Learning and Teaching Strategies	Lecturing, discussion and submission.						
Instructor (s)	Ekrem Çağlar Yılmaz, PhD						
Course Objective	*To teach the basics of discrete mathematical structures*						
Course Content	Propositional Logic • Predicate Logic • Sets and Functions • Integers and Algorithms • Induction and Recursion • Counting • Relations • Graphs • Trees						
References	K. H. Rosen, Discrete Mathematics and Its Applications, McGraw-Hill, Seventh Edition, 2011						
Learning Outcomes	After taking this course students will be able to; 1. Apply mathematical reasoning and combinatorial analysis 2. Design discrete structures for computations 3. Apply algorithmic thinking 4. Formulate problems using mathematical structure						

Subjects by Weeks

Weeks	Subjects
1. Week	The Foundations: Logic and Proofs
2. Week	The Foundations: Logic and Proofs

3. Week	The Foundations: Logic and Proofs
4. Week	The Foundations: Logic and Proofs
5. Week	Basic Structures: Sets, Functions, Sequences, Sums, and Matrices
6. Week	Basic Structures: Sets, Functions, Sequences, Sums, and Matrices
7. Week	Algorithms
8. Week	Number Theory and Cryptography
9. Week	Induction and Recursion
10. Week	Counting
11. Week	Relations
12. Week	Graphs
13. Week	Graphs
14. Week	Review Week

Assessment Method

Semester Works	Number	Contribution
Attendance & Contribution to Lecture	14	5%
Laboratory	0	0%
Application	0	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	%40
Final Exam	1	%50
Total	18	%100
Contribution of Semester Works to Success Points	3	%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			
Application			
Specific Practical Training			
Field Activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework Assignment	14	2	28
Midterms (Study Duration)	1	2	2
Final Exam (Study Duration)	1	2	2
Total Workload	144		
Total Workload/30 hours	4.88		
ECTS	5.00		

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
P	1	a	X	X	X	X		
R		b						

O		c						
G	2	a						
R		b						
A		c						
M	3	a						
		b						
O	4	a						
U		b						
T		c						
C	5	a						
O		b						
M	6	a						
E		b						
S	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a		X	X			

		b						
	14	a						
		b						
		c						
	15							

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Course Information

CENG 214 - Algorithms II

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Algorithms II	CENG 214	Fall	3	0	0	3	6

Prerequisites	• CENG 213 - Algorithms and Data Structures • A good working knowledge of C++ programming through recursion, dynamic memory, and basic data structures such as stacks, queues, and linked lists.
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)	Assoc.Prof. Ender Sevinç
Course objective	This course aims to introduce you to data structures, an issue central to the art of computer programming. At the end of the course, you will be equipped with data organization tools to write simple, clear, and efficient programs. The course will be structured around a comprehensive set of computer assignments to enable you to get hands-on experience. Complex data structures are to be discussed.
Course Content	This course aims to introduce you to data structures, an issue central to the art of computer programming. At the end of the course, you will be equipped with data organization tools to write simple, clear, and efficient programs. The course will be structured around a comprehensive set of computer assignments to enable you to get hands-on experience. The programming language of choice will be C/C++ and Dev-C++ API v.5.11.
References	1. Frank M. Carrano and Timothy Henry, "Data Abstraction & Problem Solving with C++", 7th Ed., 2016, Pearson. 2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, "Introduction To Algorithms", The MIT Press; 3rd edition.
Learning outcomes	After taking this course students will be able to; 1. Introduction to complex data structures, 2. Introduction to Binary Trees (BT), balanced BT.s, and heaps 3. Write simple, clear C++ programs and analyze the algorithm executions 4. Understand and implement graph theory experiments and structures (Dijkastra alg., Travelling Salesman Problem, Min. Spanning Tree) 5. Collect data, conduct experiments, and analyze and interpret results with a comprehensive set of computer assignments.

Form IVb (English): Subjects by weeks

Week	Topics (tentative)	
1	Trees	Ch. 15
2	Tree Implementations	Ch. 16
3	Binary Tree, Binary Search Trees	Ch. 16
4	Heaps,	Ch. 17
5	Priority Queue	Ch. 17
6	Dictionaries (Hashing)	Ch. 18
7	Balanced Search Trees	Ch. 19
	Midterm	
8	Balanced Search Trees (2-3, 2-3-4 Trees)	Ch. 19
9	Balanced Search Trees (Red-Black, AVL)	Ch. 19
10	Graphs (Directed, undirected)	Ch. 20
11	Graphs (Topological sorting)	Ch. 20
12	Applications of Graphs (Hamiltonian Paths)	Ch. 20
13	Applications of Graphs (Depth-First Search, Breadth-First Search, Min. Spanning Tree, Dijkstra alg.)	Ch. 20
14	Processing data in external storage (B+ Tree)	Ch. 21
	Final	

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	2	%20
Presentation	0	%0
Project	1	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%50
Total	19	%100
Contribution of semester Works to success points	4	%50
Contribution of the final exam to success points	1	%50
Total	19	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

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

Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	2	12	24
Midterm (Study duration)	1	16	16
Final Exam (Study duration)	1	20	20
Total Workload			172
Total Workload/30 hours			5.73
ECTS			6.00

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUTCOMES	1	a						
		b						
		c			X	X	X	
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a			X	X	X	

		b						
		c						
	15							

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CENG 213 - Data Structures and Algorithms

Course Information

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Data Structures and Algorithms	CENG 213	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)	Assoc.Prof. Ender Sevinç						
Course objective	The objective of this course is to teach the notion of abstract data type (ADT). This course introduces algorithms and data structures for implementing several ADTs, such as Linked Lists, Sorting Algorithms, Stack and Queues. Another purpose of this course is to teach students the fundamentals of C/C++ language. C++ is a powerful computer programming language that is appropriate for technically oriented people with little or no programming experience and it should be used for designing experiments as well						
Course Content	The purpose of this course is to introduce you to data structures, an issue central to the art of computer programming. At the end of the course, you will be equipped with the tools of data organization to enable you to write simple, clear, and efficient programs. The course will be structured around a comprehensive set of computer assignments to enable you to get hands-on experience. The programming language of choice will be C/C++ and Dev-C++ API v.5.11.						
References	1. Paul Deitel & Harvey Deitel, "C++: How to program / P.J. Deitel, H.M. Deitel", 8th Ed., 2016, Pearson 2. Frank M. Carrano and Timothy Henry, "Data Abstraction & Problem Solving with C++", 7th Ed., 2016, Pearson.						
Learning outcomes	After taking this course, students will be able to know; 1. Introduction to C++ language, 2. Introduction to classes, functions, recursion, and data structures, 3. Plan experiments to find out the differences among the sorting algorithms						

	4. Write simple, clear C++ programs and analyze the algorithm executions 5. Plan a comprehensive set of computer assignments to get hands-on experience.

Form IVb (English): Subjects by weeks

Week	Topic	Book	Theory+Lab
1	Introduction to C++ Programming	Deitel (1st ref)	3 hrs.
2	Introduction to Classes, Objects and Strings	"	3 hrs.
3	Control Statements	"	3 hrs.
4	Functions	"	3 hrs.
5	Recursion	"	3 hrs.
6	Arrays and Vectors	"	3 hrs.
7	Pointers	"	3 hrs.
	Midterm		
8	Algorithm Efficiency	"	3 hrs.
9	Link-Based Implementations	Carrano (2nd ref)	3 hrs.
10	Stacks	"	3 hrs.
11	List & List Implementations	"	3 hrs.
12	Sorting (selection, bubble, insertion)	"	3 hrs.
13	Sorting (merge-sort, quick-sort, radix sort)	"	3 hrs.
14	Queues & Priority Queues	"	3 hrs.
	Final		

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	2	%20
Presentation	0	%0
Project	1	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%50
Total	19	%100
Contribution of semester Works to success points	4	%50
Contribution of the final exam to success points	1	%50
Total	19	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

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

Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation)	14	4	56
Presentation / Seminar Preparation			
Project			
Homework assignment	2	8	16
Midterm (Study duration)	1	12	12
Final Exam (Study duration)	1	16	16
Total Workload			142
Total Workload/30 hours			4.73
ECTS			5.00

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUTCOMES	1	a						
		b						
		c		X		X		
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b			X	X	X	
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						

		b						
	14	a			X	X		
		b						
		c						
	15							

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CENG 223 – Discrete Mathematics

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Discrete Mathematics	CENG 223	Fall	3	0	0	3	5
Prerequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery	Face to face/Distance Learning/Hybrid						
Learning and Teaching Strategies	Lecturing, discussion and submission.						
Instructor (s)	Ekrem Çağlar Yılmaz, PhD						
Course Objective	*To teach the basics of discrete mathematical structures*						
Course Content	Propositional Logic • Predicate Logic • Sets and Functions • Integers and Algorithms • Induction and Recursion • Counting • Relations • Graphs • Trees						
References	K. H. Rosen, Discrete Mathematics and Its Applications, McGraw-Hill, Seventh Edition, 2011						
Learning Outcomes	After taking this course students will be able to; 5. Apply mathematical reasoning and combinatorial analysis 6. Design discrete structures for computations 7. Apply algorithmic thinking 8. Formulate problems using mathematical structure						

Subjects by Weeks

Weeks	Subjects
15. Week	The Foundations: Logic and Proofs

16. Week	The Foundations: Logic and Proofs
17. Week	The Foundations: Logic and Proofs
18. Week	The Foundations: Logic and Proofs
19. Week	Basic Structures: Sets, Functions, Sequences, Sums, and Matrices
20. Week	Basic Structures: Sets, Functions, Sequences, Sums, and Matrices
21. Week	Algorithms
22. Week	Number Theory and Cryptography
23. Week	Induction and Recursion
24. Week	Counting
25. Week	Relations
26. Week	Graphs
27. Week	Graphs
28. Week	Review Week

Assessment Method

Semester Works	Number	Contribution
Attendance & Contribution to Lecture	14	5%
Laboratory	0	0%
Application	0	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	%40
Final Exam	1	%50
Total	18	%100
Contribution of Semester Works to Success Points	3	%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			
Application			
Specific Practical Training			
Field Activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework Assignment	14	2	28
Midterms (Study Duration)	1	2	2
Final Exam (Study Duration)	1	2	2
Total Workload	144		
Total Workload/30 hours	4.88		
ECTS	5.00		

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUTC	1	a	X	X	X	X		
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						

O M E S	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a		X	X			
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY

FACULTY OF ENGINEERING

COMPUTER ENGINEERING DEPARTMENT

CENG 241 – Programming Languages

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Programming Languages	**CENG 241**	Fall	3	0	0	3	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)	M.Nedim Alpdemir, Assoc. Prof. Dr.						
Course objective	Aim of this course is to introduce the student to the fundamental concepts and paradigms of programming languages and to provide the tools necessary to critically evaluate existing and future programming languages.						
Course Content	Values and types in programming languages, concept of variables and storage, scope and binding strategies, types of abstraction, control of flow						
References	1. Concepts of Programming Languages (12th ed.), Robert W. Sebesta, Pearson, 2019 2. The C++ (3rd Ed.), Bjarne Stroustrup, Addison Wesley Publishing Company, 1997						

Learning outcomes	After taking this course students will be able to; 1. Understand general concepts common to all programming languages, Familiarize with Attribute grammars to describe both the syntax and static semantics of languages, learn fundamentals of lexical and syntax analysis and learn the most common notation to describe the syntax (i,.e. BNF) 2. Understand variables, data types, expressions and assignment statements İncluding the binding and scoping strategies to manage those language constructs 3. Understand control flow mechanisms used in programming languages belonging to different families 4. Understand the importance of data and process abstraction and means to achieve them, such as object-oriented programming concepts 5. Understand the fundamentals of concurrency and synchronization between concurrent units 6. Understand the fundamentals of exception handling

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction to programming languages & preliminaries
2. Week	Describing Syntax and Semantics
3. Week	Lexical and Syntax Analysis
4. Week	Names, Bindings, and Scopes
5. Week	Data Types
6. Week	Data Types
7. Week	Expressions and Assignment Statements
8. Week	Mid- term exam
9. Week	Statement-Level Control Structures
10. Week	Subprograms
11. Week	Abstract Data Types and Encapsulation Constructs
12. Week	Support for Object-Oriented Programming
13. Week	Concurrency

14. Week	Exception Handling and Event Handling
15. Week	Final Exam

Form Vb (İngilizce): Assessment Method

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

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
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	14	3	42
Homework assignment			
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	5	5
Total Workload			175
Total Workload/30 hours			5.83
ECTS			6.00

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUTCOMES	1	a						
		b		X		X	X	
		c	X			X		
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a		X	X		X	
		b	X			X		X
		c						
	15							

ANKARA SCIENCE UNIVERSITY

FACULTY OF ENGINEERING

COMPUTER ENGINEERING DEPARTMENT

CENG 214 – Algorithms II

Course Information

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Algorithms II	CENG 214	Fall	3	0	0	3	6
Prerequisites	• CENG 213 - Algorithms and Data Structures • A good working knowledge of C++ programming through recursion, dynamic memory, and basic data structures such as stacks, queues, and linked lists.						
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)	Assoc.Prof. Ender Sevinç						
Course objective	This course aims to introduce you to data structures, an issue central to the art of computer programming. At the end of the course, you will be equipped with data organization tools to write simple, clear, and efficient programs. The course will be structured around a comprehensive set of computer assignments to enable you to get hands-on experience. Complex data structures are to be discussed.						
Course Content	This course aims to introduce you to data structures, an issue central to the art of computer programming. At the end of the course, you will be equipped with data organization tools to write simple, clear, and efficient programs. The course will be structured around a comprehensive set of computer assignments to enable you to get hands-on experience. The programming language of choice will be C/C++ and Dev-C++ API v.5.11.						
References	3. Frank M. Carrano and Timothy Henry, "Data Abstraction & Problem Solving with C++", 7th Ed., 2016, Pearson. 4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, "Introduction To Algorithms", The MIT Press; 3rd edition.						
Learning outcomes	After taking this course students will be able to; 6. Introduction to complex data structures, 7. Introduction to Binary Trees (BT), balanced BT.s, and heaps 8. Write simple, clear C++ programs and analyze the algorithm executions 9. Understand and implement graph theory experiments and structures (Dijkastra alg., Travelling Salesman Problem, Min. Spanning Tree) 10. Collect data, conduct experiments, and analyze and interpret results with a comprehensive set of computer assignments.						

Form IVb (English): Subjects by weeks

Week	Topics (tentative)	
1	Trees	Ch. 15
2	Tree Implementations	Ch. 16
3	Binary Tree, Binary Search Trees	Ch. 16
4	Heaps,	Ch. 17
5	Priority Queue	Ch. 17
6	Dictionaries (Hashing)	Ch. 18
7	Balanced Search Trees	Ch. 19
	Midterm	
8	Balanced Search Trees (2-3, 2-3-4 Trees)	Ch. 19
9	Balanced Search Trees (Red-Black, AVL)	Ch. 19
10	Graphs (Directed, undirected)	Ch. 20
11	Graphs (Topological sorting)	Ch. 20
12	Applications of Graphs (Hamiltonian Paths)	Ch. 20
13	Applications of Graphs (Depth-First Search, Breadth-First Search, Min. Spanning Tree, Dijkstra alg.)	Ch. 20
14	Processing data in external storage (B+ Tree)	Ch. 21
	Final	

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	2	%20
Presentation	0	%0
Project	1	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%50
Total	19	%100
Contribution of semester Works to success points	4	%50
Contribution of the final exam to success points	1	%50
Total	19	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

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

Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	2	12	24
Midterm (Study duration)	1	16	16
Final Exam (Study duration)	1	20	20
Total Workload			172
Total Workload/30 hours			5.73
ECTS			6.00

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUTCOMES	1	a						
		b						
		c			X	X	X	
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a			X	X	X	

		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY

FACULTY OF ENGINEERING

COMPUTER ENGINEERING DEPARTMENT

CENG 256 - Formal Languages and Automata Theory

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Formal Languages and Automata Theory	CENG 256	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)	Asst. Prof. Dr. Mesut ÜNLÜ, Asst.Prof. Dr. Ekrem Çağlar YILMAZ						
Course Objective	*To teach the basics of formal languages, abstract machines and automata theory together with complexity analysis*						
Course Content	• Mathematical Concepts; Alphabets and Languages • Regular Languages and Finite automata • Context-free Languages and Pushdown Automata • Recursively Enumerable sets and Turing Machine • The Language Hierarchy • Correspondence Between Grammars and Automata • Determinism vs. Nondeterminism						
References	Lewis, H. R., & Papadimitriou, C.H. *Elements of the Theory of Computation (2nd ed.),* Prentice-Hall, 1998. Rich, E. *Automata, Computability and Complexity: Theory and Applications (revised ed.),* Pearson Prentice Hall, 2019						
Learning Outcomes	Computer Science needs mathematical languages to abstract away from particulars of computing machinery and to concentrate on the systematicity, capacity, and efficiency of computing in the abstract. Theory of formal languages studies such languages while automata theory studies their acceptors. Both theories have found scientific and practical use in all areas of computer science and engineering. In fact, description of any computational process can be recast in formal language theory or automata theory. From this perspective, the theory can be seen as a vehicle for communicating the ideas clearly and precisely among computer scientists.						

Subjects by Weeks

Weeks	Subjects

1. Week	Review of Discrete Maths and Computational Structures
2. Week	Finite Representations of Languages
3. Week	Alphabets and Languages
4. Week	Regular Languages, Equivalence of DFA and NFA
5. Week	Deterministic Finite Automata (DFA) Theory
6. Week	Non-deterministic Finite Automata (NFA) Theory and The Pumping Lemma
7. Week	Context-free Languages, Parse Trees and Derivations
8. Week	Pushdown Automata Theory
9. Week	**Midterm Exam**
10. Week	The Pumping Theorem and its Applications **(R)**
11. Week	Correspondence Between Grammars and Automata, Closure Properties **(R)**
12. Week	Recursively Enumerable Sets and Linear Bounded Automata Theory **(R)**
13. Week	Turing Machines and its Extensions
14. Week	The Language Hierarchy, Church-Turing Thesis
15. Week	Introduction to Complexity Theory and The Halting Problem
16. Week	**Final Exam**

Assessment Method

Semester Works	Number	Contribution
Attendance & Contribution to Lecture		
Laboratory		
Application		
Fieldwork		
Practice		
Homework Assessment	2	%10
Quiz		
Presentation		
Project		
Seminar		
Mid-term Exam(s)	1	%40
Final Exam	1	%50
Total	18	%100
Contribution of Semester Works to Success Points	3	%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			
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		

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OU	1	a						
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						

T		c						
C	5	a						
O		b						
M	6	a						
E		b						
S	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
COMPUTER ENGINEERING DEPARTMENT

MATH 206 - Probability and Statistics for Engineers

Course Information

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Probability and Statistics for Engineers	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)	Dr. Seher Fişekci Par						
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: 1. Understand the basic knowledge on fundamental probability concepts, including random variable, probability of an event, additive rules, and conditional probability						

Learning Outcomes	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	0	0%
Quiz	2	15%
Presentation	0	0%
Project	0	0%
Seminar	0	0%
Mid-term Exam(s)	1	35%
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, 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 OUTCOMES - THE COURSE LEARNING OUTCOMES MATRIX

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUT COMES	1	a	X	X	X	X	X	
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b	X	X	X	X	X	
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
COMPUTER, INFORMATION SYSTEMS, SOFTWARE, AND ELECTRICAL ELECTRONICS ENGINEERING DEPARTMENTS

MATH 224 - Linear Algebra and Differential Equations

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**	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	Dr. Seher Fişekci Par						
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. 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						
	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.						

Learning Outcomes	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. 5. Determine and use orthogonality to find a basis for the null space of a matrix. 6. Compute eigenvectors and eigenvalues of a matrix and apply them to some diagonalization processes.

Form IVb (English): Subjects by weeks

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

Form VIb (English): 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		

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUTCOMES	1	a	X	X	X	X	X	X
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a	X	X	X	X	X	X
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
COMPUTER ENGINEERING DEPARTMENT

SENG 264 - Introduction to AI and Machine Learning

Course Information

Course Name	Code	Semester	Theory (hours/ week)	Application (hours/ week)	Laboratory (hours/ week)	National Credit	ECTS
Introduction to AI and Machine Learning	SENG 264	Fall	3	0	0	3	5
Prerequisites	CENG 101, MATH 101						
Course Language	English						
Course Type	Compulsory/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)	Dr. Sarper ALKAN						
Course objective	To teach the basics of machine learning along with tensorflow framework						
Course Content	Introduction to machine learning with python and tensorflow. Linear regression, logistic regression, basics of neural network operation and training. Decision tree and support vector machine classifiers. Unsupervised learning and recommender systems.						
References	1. Introduction to Machine Learning with Python. Andreas C. Müller, Sarah Guido.						

	2.
Learning outcomes	After taking this course students will be able to; 1. Learn supervised and unsupervised machine learning algorithms 2. Implement the algorithms using python and tensorflow 3. Fine tune the machine learning algorithms 4. Learn the best practices in machine learning

Subjects by weeks

Weeks	Subjects
1. Week	Introduction to machine learning, Python tutorial
2. Week	Numpy, pandas tutorial
3. Week	Machine learning basics: Linear regression with gradient descent
4. Week	Regression with multiple input variables, feature scaling
5. Week	Classification with logistic regression and gradient descent
6. Week	Matplotlib, Scikit-learn tutorial, Coding exercises for machine learning
7. Week	Mathematical measures for assessing model performance (R1, R2, F1 scores, ROC curve, Accuracy, precision, recall, True Positive Rate, False Positive rate)
8. Week	Mid Term Exam
9. Week	Neural networks, Tensorflow
10. Week	Neural network training
11. Week	Decision trees: Measures of impurity, entropy
12. Week	Practical advice for machine learning: Training, validation and testing.
13. Week	Unsupervised learning, Clustering with K-means
14. Week	Recommender systems
15. Week	Final Exam

Form Vb (English): Assessment Method

Semester Works	Number	Contribution
Attendance	14	5
Laboratory		0
Application		0
Fieldwork		0
Practice		0
Homework Assessment	1	10
Quiz	1	10
Presentation		0
Project		0
Seminar		0
Mid-term Exams	1	35

Final Exam	1	40
Total		100
Contribution of semester Works to success points		60
Contribution of final exam to success points	1	40
Total	18	100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	**Number**	**Duration (hour)**	**Total Workload**
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project			
Homework assignment	1	5	5
Quiz	1	5	5
Midterms (Study duration)	1	8	8
Final Exam (Study duration)	1	14	14
Total Workload	144		
Total Workload/30 hours	4.8		
ECTS	5		

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAMOUTCOMES	1	a						
		b						
		c	x					
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b		x				
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

CENG 301 - Operating Systems

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Operating Systems	CENG 301	Fall	3	0	0	3	5
Prerequisites							
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)							
Course objective	The objective of this course is to provide students with a comprehensive understanding of the principles, structures, and functionalities of modern operating systems. Students will learn how operating systems manage hardware and software resources, coordinate concurrent activities, and provide essential services for application programs. The course aims to develop both theoretical knowledge and practical skills through problem-solving, programming exercises, and system analysis, preparing students to design, implement, and evaluate operating system components and policies.						
Course Content	1- Introduction to Operating Systems 2- Operating System Structures 3- Processes 4- Threads and Multithreading 5- CPU Scheduling 6- Process Synchronization 7- Deadlocks 8- Memory Management 9- Virtual Memory 10- File System Interface 11- File System Implementation 12- Mass Storage and I/O Systems 13- Protection 14- Security						
References	1- Silberschatz, A., Galvin, P. B., & Gagne, G. (2018). Operating System Concepts (10th ed.). Wiley.						

	2- Tanenbaum, A. S., & Bos, H. (2015). Modern Operating Systems (4th ed.). Pearson.
Learning outcomes	By the end of this course, students will be able to: 1. Explain and understand the structure, functions, and types of modern operating systems. 2. Describe and analyze process management, CPU scheduling, and multithreading concepts, and apply synchronization techniques. 3. Compare and evaluate memory management and virtual memory techniques. 4. Analyze I/O systems and their interaction with the operating system and discuss protection and security mechanisms in operating systems.

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction to Operating Systems – overview, history, types of OS
2. Week	Operating System Structures – services, system calls, architecture
3. Week	Processes – concept, states, PCB, process scheduling basics
4. Week	Threads and Multithreading – models, libraries, benefits
5. Week	CPU Scheduling – criteria, algorithms, evaluation
6. Week	Process Synchronization – critical section, semaphores, monitors
7. Week	Deadlocks – conditions, prevention, avoidance, detection, recovery
8. Week	Midterm Exam
9. Week	Memory Management – allocation methods, paging, segmentation
10. Week	Virtual Memory – demand paging, page replacement algorithms
11. Week	File System Interface – file concepts, directories, access methods
12. Week	File System Implementation & I/O Systems – allocation, free space, disk scheduling
13. Week	Protection & Security – access control, authentication, encryption
14. Week	Advanced Topics & Case Studies – distributed systems, Linux/Windows case study

15. Week	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	%5
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	2	%25
Presentation	1	%0
Project	1	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	18	%100
Contribution of semester Works to success points	3	%60
Contribution of final exam to success points	1	%40
Total	18	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

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

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

			COURSE LEARNING OUTCOMES			
			LO1	LO2	LO3	LO4
PROGRAM OUT COMES	1	a				
		b	x	x		
		c				
	2	a				
		b				
		c				
	3	a				
		b				
	4	a				
		b				
		c				
	5	a				
		b				
	6	a				
		b				
	7	a				
		b				
	8	a				
		b				
	9	a				
		b				
	10	a				
		b				
	11	a				
		b				
		c				
	12					
	13	a				
		b				
	14	a				
		b				
		c				
	15					

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

CENG 351 - Database Management Systems

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Database Management Systems	CENG 351	Fall	3	0	0	3	5
Prerequisites							
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)							
Course objective	The objective of this course is to enable students to understand the fundamental concepts, architecture, and functioning of modern database management systems. The course aims to develop students' ability to design, implement, and manage relational databases by applying conceptual modeling techniques, normalization rules, and structured query language (SQL). Upon completion, students will be capable of analyzing real-world data problems, designing efficient database schemas, and developing reliable database applications with transaction management and data integrity considerations.						
Course Content	1- Database System Concepts and Architecture 2- Relational model 3- Database design, ER diagrams, 1NF, 2NF, 3NF, BCNF, +NF 4- Relational algebra: select, project, join, division 5- Integrity constraints, primary keys, foreign keys 6- SQL query language and Data Definition Language 7- Data Manipulation Language 8- SQL Joins 9- Views 10- Procedure and Transactions						
References	1- Ramakrishnan, R. & Gehrke, J., *Database Management Systems (3rd ed.)*, McGraw-Hill Higher Education, 2018 2- Ramez Elmasri, R. & Navathe, S. B., *Fundamentals of Database Systems (7th ed.),* Pearson, 2016						
Learning outcomes	By the end of this course, students will be able to: 1- Explain the basic concepts, architecture, and components of database management systems.						

	2- Model real-world problems using Entity–Relationship (ER) diagrams. 3- Convert ER models into relational schemas and apply normalization techniques (1NF–BCNF) to reduce redundancy. 4- Use relational algebra operations to analyze and solve database queries. 5- Write effective SQL statements using DDL and DML commands, joins, views, and nested queries. 6- Explain and apply transaction management concepts including concurrency control, commit, rollback, and recovery mechanisms.

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction to Database
2. Week	Database System Concepts and Architecture
3. Week	Relational Databases
4. Week	Relational model, ER diagrams
5. Week	Database design, 1NF, 2NF, 3NF, BCNF, 4NF
6. Week	Database design, 1NF, 2NF, 3NF, BCNF, 4NF
7. Week	Relational algebra: select, project, join, division
8. Week	**Midterm exam**
9. Week	The Relational Data Model and Relational Database Constraints
10. Week	SQL query language and Data Definition Language
11. Week	SQL query language and Data Manipulation Language
12. Week	SQL query language and Data Manipulation Language
13. Week	Aggregate Functions and Joins
14. Week	SQL Nested Queries, Procedures and Transactions
15. Week	Transaction management: commit, abort, recovery
16. Week	**Final Exam**

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	0	%0
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Quiz	1	%10
Homework Assessment	0	%0
Presentation	1	%0
Project	1	%20
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	5	%100
Contribution of semester Works to success points	4	%60
Contribution of final exam to success points	1	%40
Total	5	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

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

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUT COMES	1	a						
		b	x	x	x	x		x
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a						
		b						
		c			x		x	x
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

SENG 321 - Software Engineering

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Software Engineering	SENG 321	Fall	3	0	0	3	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)	Hakan Çağlar, Prof.Dr.						
Course objective	This course aims to provide students with a common understanding of software engineering principles & software processes. It is organized so as to, first, provide a general introduction to software development and identify the important phases & milestones of a software project. Then, each of the phases is examined in detail, to give the student a picture of the current state of software development. students learn the theoretical and practical aspects of specification and design, development, verification and validation, and documentation stages of SE. Moreover, this course enables students to realize software specification and design phases of sample projects.						

Course Content	1. Introduction to SW engineering & SW code of ethics 2. SW development processes 3. SW gates (SRR, CDR, TRR..) IEEE standards & documentation 4. Requirement Engineering 5. System & software engineering 6. SW architecture 7. Security engineering 8. SW Testing 9. CASE tolls 10. SW application development, Re-use, Legacy systems, RMA analysis
References	1. Object-Oriented Software Engineering: Using UML, Patterns, and Java™ Third dition, Bernd Bruegge & Allen H. Dutoit 2.Software Engineering 10th Edition by Ian Sommerville, Pearson Education, 2015 ISBN: 9781292096131, 3. Software Engineering A PRACTITIONER' S APPROACH 8th Edition by Roger S. Pressman, Bruce R. Maxim Mc Graw Hill Education
Learning outcomes	After taking this course students will be able to; 1. Define engineering, software, computer and system engineering 2. Define software processes & Software ethics 3. Implement software project management practices considering their impacts on society, health and safety, the economy, sustainability, and the environment, in alignment with the United Nations Sustainable Development Goals. 4. Gather the software requirements (functional, non-functional) 5. Define software design and architecture (UML Object Oriented Design) 6. Learn the software verification and validation

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction to software engineering, FAQs about software engineering, costs of software engineering, activity cost distribution, attributes of good software, key challenges facing software engineering, professional and ethical responsibility
2. Week	Systems engineering fundamentals, brief history of systems engineering, success ratio of IT projects, main purpose of systems engineering, systems engineering environment, system lifecycle functions, basic systems theory concepts
3. Week	Main principles & fundamentals of systems engineering, characteristic end responsibilities, systems engineering activities across system life cycle, key system engineering concepts, context diagrams, system boundaries & interfaces, systems decomposition & abstraction, multiple system views systems engineering standards
4. Week	Software process models, process iteration and activities (sw specification, sw design & implementation, sw validation, sw evolution), rational unified process (RUP), software engineering standards (commercial & military), component based, re-used oriented, extreme programming, Legacy systems.
5. Week	Requirement analysis, definition of requirement, purpose of requirement analysis, risk & problems, what are requirements for?, Requirements analysis task areas and requirement analysis questions,
6. Week	Types of requirements (functional, performance, state/mod, interface etc.), requirements measure (speed, ease of use, portability, robustness, reliability...), requirements quality metrics (verifiability, consistency, singularity, clarity, completeness, feasibility etc.), writing good requirements, requirements template, requirements decomposition. Software requirement specification (SRS) outlines.
7. Week	Software design, UML diagrams (use-case, class diagrams, sequence diagrams, activity diagram, component diagrams)

8. Week	Midterm Exam
9. Week	System & software architecture (central, distributed...), software design, software design description (SDD), software modelling, UML diagrams, use cases and boundaries, software design tools.
10. Week	Software Project planning, project management plan (PMP), Critical Milestones, activities & review meetings (SRR, SDR, PDR, CDR, TRR),
11. Week	Software quality assurance, software quality process, Capability Maturity Model (CMM-I), software quality plan, Software Metrics, Software configuration management plan.
12. Week	Test engineering, validation and verification process, Test and Integration Plan (TIP), Test scenarios, Test procedures, Test data, unit testing, integration test, Test Readiness Review (TRR), Test CASE tools, Load Test (Load Runner), Software bug management, version management & control.
13. Week	Security engineering, information warfare fundamentals, software attack phases, what is security (confidentiality, integrity, availability CIA), functionality vs assurance, security threats & risk analysis, elements of cryptography, ciphers, public key cryptography, RSA, digital signatures, hash functions.
14. Week	Project presentations...
15. Week	Final Exam

Course Requirements

The students are expected to develop a software project with a team of 2 - 4. The documentation and presentation of the project is the primary focus. Therefore, implementation will be ignored. The project topic will be proposed by the teams. Microsoft Word, Power Point and MS-Project can be used during the development of the projects.

Form Vb (İngilizce): Assessment Method

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

Form VIb (English): WORKLOAD AND ECTS CALCULATION

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

Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	4	56
Presentation / Seminar Preparation			
Project	14	3	42
Homework assignment	0	0	0
Midterm (Study duration)	1	10	10
Final Exam (Study duration)	1	20	20
Total Workload			170
Total Workload/30 hours			5.67
ECTS			6.00

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUTCOMES	1	a						
		b						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a					x	
		b					x	
		c					x	
	5	a						
		b						
	6	a						
		b						
	7	a		x				
		b						
	8	a						
		b						
	9	a						
		b						
	10	a			x			
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a						
		b				x	x	
		c						
	15							

ANKARA SCIENCE UNIVERSITY

FACULTY OF ENGINEERING

COMPUTER ENGINEERING DEPARTMENT

CENG 361 - Web Design and Programming

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Web Design and Programming	CENG 361	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)	Assoc.Prof.Dr. Ender Sevinç
Course Objective	- Understand basic web technologies (HTML, CSS stylesheets). - Understand PHP, forms, and DB interaction effectively - Understand the use of event-driven programming in JavaScript. - Use AJAX tools to build web pages that connect to servers. - Write their own server-side code to provide access to a database - Implement, design, and present a web project using all technologies stated, - Good teamwork and achieve project goals.
Course Content	• HTML 5.0 & CSS 3.0 • PHP 8.1.x • JavaScript (JS) ECMAScript 6 (ES6) and more recent • HTML Form Generation using Document Object Model(DOM), • Database Interaction with PHP. • Prototype and jQuery frameworks • AJAX (Asynchronous JavaScript And XML)
References	a. Stepp, M. Miller, J. and Kirst, V., Web Programming Step by Step, 2009 (or newer edition such as 2nd Ed. In 2012) b. Robbins, J. Niederst, Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript and Web Graphics, 2012

Learning Outcomes	1. To be able to define the main components of web architecture, 2. To be able to explain the purpose of using front-end and back-end web technologies to solve complex engineering problems. 3. To plan a project using HTML, CSS, PHP, JS, and related frameworks to work effectively as a team member or leader individually and on interdisciplinary teams. 4. To be able to express the concept, types, and benefits of HTML, CSS, PHP, and JS. 5. To be able to explain the server-side process and server-side database operations, 6. Able to identify, describe, formulate, and analyze complex engineering problems using HTML, CSS, PHP, JS, and related frameworks to provide and consider the UN Sustainable Development Goals relevant to the problem being addressed.

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	The Internet and World Wide Web
2. Week	Basic HTML
3. Week	Cascading Style Sheets (CSS)
4. Week	Page Layout
5. Week	PHP for server-side programming
6. Week	Advanced PHP syntax
7. Week	HTML forms and server-side data
	Midterm Exam
8. Week	Relational Databases and SQL
9. Week	Interacting with a database using PHP
10. Week	JavaScript For Interactive Web Pages
11. Week	Document Object Model (DOM)
12. Week	JQuery library
13. Week	Events And the Prototype Library
14. Week	AJAX and XML
	Final Exam

Form Vb (İngilizce): 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
Project	1	%35
Seminar	0	%0
Mid-term Exams	1	%25
Final Exam	1	%40
Total	19	%100
Contribution of semester Works to success points	4	%60
Contribution of the final exam to success points	1	%40
Total	19	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation)	14	4	56
Presentation / Seminar Preparation			
Project	1	30	30
Homework assignment			
Midterm (Study duration)	1	12	12
Final Exam (Study duration)	1	16	16
Total Workload			156
Total Workload/30 hours			5.20
ECTS			5.00

Form VIIb (English):

PROGRAM OUTCOMES - THE COURSE LEARNING OUTCOMES MATRIX

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUTCOMES	1	a						
		b						
		c	X	X	X		X	
	2	a						X
		b						X
		c						X
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a			X	X		
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

COURSE INFORMATION

CENG 332 - Computer Architecture

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Computer Architecture	CENG 332	Spring	3	0	2	4	6
Prerequisites	None						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery	Face to face/Distance Education						
Learning and teaching strategies	Lectures, Problem Solving.						
Instructor (s)	Mahmut MOL						
Course objective	Understand the fundamentals of instruction set architectures (ISAs), particularly RISC-V. Analyze and implement programs using assembly language. Explain how instructions are executed through datapaths and control logic. Understand pipelining and identify hazards and solutions. Analyze the memory hierarchy including caches and virtual memory. Understand input/output systems and performance measures.						
Course Content	Computer Abstractions and Technology, RISC-V Instructions, Arithmetic for computers, The Processor: Datapath & Control, Memory Hierarchy, Caches, Virtual Machines, Virtual Memory, Parallel Processors, Graphics Processing Units						

References	Computer Organization and Design The Hardware Software Interface, 2nd Edition, David A. Patterson and John L. Hennessy, 2021, Morgan Kaufmann ISBN: 978-0-12-820331-6
Learning outcomes	After taking this course, students will be able to; 1. Evaluate performance metrics and trade-offs in computer systems. 2. Understand the fundamentals of instruction set architectures (ISAs), particularly RISC-V. 3. Analyze and implement programs using assembly language. 4. Explain how instructions are executed through datapaths and control logic. 5. Understand pipelining and identify hazards and solutions. 6. Analyze the memory hierarchy including caches and virtual memory. 7. Explore parallel processing, multicore architectures and graphics processing units

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	Introduction to Computer Architecture and RISC-V
2	RISC-V Assembly Language Programming
3	RISC-V Procedures, Stacks, and Control Flow
4	Characters, Addressing, Parallelism and Instructions: Synchronization
5	Arithmetic for Computers: Integer and Floating-Point
6	Building a Processor: Single-Cycle Datapath
7	Control Signals and Implementation
8	Pipelining: Basic Concepts and Pipeline Hazards
9	Performance and Pipelining: Hazards and Forwarding
10	Memory Hierarchy: Caches
11	Virtual Memory and Memory Management
12	Parallel Processors & Multicore Architectures

13	Graphics Processing Units
14	Review of topics

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	5	%10
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Quizzes	4	%20
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	25	%100
Contribution of semester Works to success points	24	%60
Contribution of final exam to success points	1	%40
Total	25	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory	5	2	10
Application			
Specific practical training			
Field activities			

Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	4	56
Presentation / Seminar Preparation			
Project			
Quizzes	4	8	32
Midterms (Study duration)	1	15	15
Final Exam (Study duration)	1	30	30
Total Workload			185
Total Workload/30 hours			6.16
ECTS			6.00

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

			COURSE LEARNING OUTCOMES						
			LO1	LO2	LO3	LO4	LO5	LO6	L07
PROGRAM OUT COMES	1	a							
		b							
		c							
	2	a							
		b							
		c							
	3	a		x		x	x	x	x
		b		x		x	x	x	x
	4	a							
		b							
		c							
	5	a							
		b							
	6	a							
		b							
	7	a							
		b							
	8	a							
		b							
	9	a							
		b							
	10	a							
		b							
	11	a							
		b							
		c							
	12								
	13	a							
		b							
	14	a							
		b	x		x		x	x	x
		c							
	15					x	x	x	

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

CENG 336 - Computer Networks

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Computer Networks	CENG 336	Fall	3	0	0	3	5
Prerequisites							
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)							
Course objective	The objective of this course is to provide students with a solid understanding of the principles, architectures, protocols, and technologies underlying computer networks. The course takes a top-down approach, starting from application-layer protocols and progressing through transport, network, link, and physical layers. Students will gain both theoretical knowledge and practical experience in network programming, analysis, and troubleshooting.						
Course Content	1- Introduction to Computer Networks 2- Application Layer 3- Transport Layer 4- Network Layer: Data Plane 5- Network Layer: Control Plane 6- Link Layer and Local Area Networks 7- Wireless and Mobile Networks 8- Multimedia Networking 9- Network Security 10- Network Management 11- Emerging Networking Technologies and Trends						
References	1- Kurose, J. F., & Ross, K. W. (2021). Computer Networking: A Top-Down Approach (8th ed.). Pearson. 2- Tanenbaum, A. S., Wetherall, D. J., & Feamster, N. (2021). Computer Networks (6th ed.). Pearson.						
Learning outcomes	By the end of this course, students will be able to: 1. Understand the architecture and layered structure of computer networks.						

	2. Able to identify, describe, formulate, and analyze a sample network application problem using socket programming to provide and consider the UN Sustainable Development Goals relevant to the problem being addressed. 3. Design creative solutions using link-layer technologies and error detection/correction techniques for real life problems. 4. Conduct experiments, collect data, analyze and interpret results of routing algorithms and protocols at the network layer and identify and evaluate emerging trends and technologies in networking. 5. Describe the protocols and services at each layer of the Internet protocol, analyze the operation and performance of network applications and protocols and explain congestion control.

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction to Computer Networks, Network edge/core, Delay/Loss
2. Week	Application Layer – Principles, Web, HTTP, FTP, Email, DNS
3. Week	Socket Programming (TCP/UDP)
4. Week	Transport Layer – Principles, Multiplexing, UDP, Reliable Data Transfer
5. Week	Transport Layer – TCP, Flow Control, Congestion Control
6. Week	Network Layer: Data Plane – Forwarding, Switching
7. Week	Network Layer: Control Plane – Routing algorithms, OSPF, BGP
8. Week	Midterm Exam
9. Week	Link Layer – Error detection, Multiple access protocols
10. Week	Local Area Networks – Ethernet, Switches, VLANs
11. Week	Wireless and Mobile Networks – Wi-Fi, Cellular
12. Week	Multimedia Networking – Streaming, VoIP, QoS
13. Week	Network Security – Cryptography, Secure protocols, Firewalls
14. Week	Network Management & Emerging Trends – SDN, 5G, IoT
15. Week	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	%5
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	2	%25
Presentation	1	%0
Project	1	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	18	%100
Contribution of semester Works to success points	3	%60
Contribution of final exam to success points	1	%40
Total	18	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

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

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

			COURSE LEARNING OUTCOMES				
			LO1	LO2	LO3	LO4	LO5
PROGRAM OUT COMES	1	a					
		b	X				
		c					
	2	a		X			
		b		X			
		c		X			
	3	a			X		
		b			X		
	4	a					
		b					
		c					
	5	a					
		b				X	
	6	a					
		b					
	7	a					
		b					
	8	a					
		b					
	9	a					
		b					
	10	a					
		b					
	11	a					
		b					
		c					
	12						
	13	a					
		b					
	14	a					
		b					
		c					
	15						

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

SENG 324 - Software Desing Patterns

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Software Desing Patterns	SENG 324	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/Distance Learning/Hybrid						
Learning and teaching strategies	Lecturing, discussion and submission.						
Instructor (s)	M. Nedim ALPDEMİR, Assoc. Prof. Dr.						
Course objective	The objective of this course is to provide an understanding of the benefits of using design patterns in developing relatively more complex software systems. The course will help the students to link fundamental Object Oriented Design (OOD) concepts and modelling techniques to software design patterns, distinguish different categories of design patterns, learn their advantages, their typical usage contexts and real world problem scenarios to which design patterns provide elegant solutions.						
Course Content	1. Introduction to Design Patterns 2. A refresher for advanced Object Oriented Design (OOD) concepts using Java, their importance for design patterns and their representation using UML 3. S.O.L.I.D. Design Principles: Guidelines for designing maintainable, extensible, robust software systems 4. Creational Design patterns: Factory Method, Abstract factory, Singleton and Prototype design patterns 5. Structural Design Patterns: Adapter, Composite, Proxy, Decorator and Façade design patterns 6. Behavioural Design Patterns: Command, State, Iterator, Strategy, Visitor, Mediator, Observer, Chain of Responsibility and Template Method design patterns 7. Combining multiple patterns for complex software systems 8. Antipatterns						
References	1. Head First Design Patterns, Eric Freeman, Elisabeth Robson with Kathy Sierra and Bert Bates, O'Reilly 2021, 2nd Ed. (Main Text Book) 2. Dive into Design Patterns, Alexander Shvets, Refactoring.Guru, 2023, v2.44 3. Design Patterns: Elements of Reusable Object Oriented Software, E. Gamma, R. Helm, R. Johnson, and J. Vlissides, Addison -Wesley Professional, 1995						

	4. Applying UML and Patterns : An Introduction to Object-Oriented Analysis and Design and Iterative Development, Craig Larman, 3rd Edition, Prentice Hall, 2005
Learning outcomes	After taking this course students will be able to; 1. Understand and gain the knowledge of the most common design principles for architecting effective and maintainable complex software systems (Pç. 1c, Pç.14b) 2. Link OOD concepts to patterns and represent them using a modelling notation (UML) (Pç.4a, Pç.4b,Pç.4c) 3. Familiarize with design pattern terminology and GoF design patterns and use them in appropriate contexts(Pç. 4a, Pç.14b) 4. Understand the importance of and gain the knowledge of harnessing the best practices of software development community and identify the available resources (i.e. design pattern catalog) (Pç.4b, Pç.14b) 5. Recognize most common and recurring design problems and propose solutions in the form of well-defined patterns (Pç. 1c) 6. Apply the most common design principles and design patterns-based solutions to real life SW development scenarios using a modern object oriented programming language (Pç.1c, Pç.4c)

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	• Welcome to design patterns, • Object Oriented Programming (OOP) and Java refresher.
2. Week	• A refresher on Object-Oriented Design (OOD) using Unified Modelling Language (UML), • S.O.L.I.D. Design Principles.
3. Week	• Pattern catalog organization, • Singleton and Prototype Design Patterns.
4. Week	• Factory Method and Abstract Factory Design Patterns
5. Week	• Adapter and Composite Design Patterns
6. Week	• Façade and Iterator Design Patterns
7. Week	• Observer Design Pattern
8. Week	Midterm exam
9. Week	• Decorator and Proxy Design Patterns

10. Week	• Command and State Design Patterns
11. Week	• Strategy Design Pattern
12. Week	• Mediator and Chain of Responsibility Design Patterns
13. Week	• Visitor and Template Method Design Patterns
14. Week	• Compound Patterns, Anti patterns • Patterns in real world
15. Week	Project demostrations
16. Week	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	%5
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	0	%0
Presentation	0	%0
Project	1	%25
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	18	%100
Contribution of semester Works to success points	3	%60
Contribution of final exam to success points	1	%40
Total	18	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

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

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUTCOMES	1	a						
		b						
		c	X				X	X
	2	a						
		b						
		c						
	3	a						
		b						
	4	a		X	X			
		b		X		X		
		c		X				X
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a						
		b	X			X		
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

CENG 384 - Intro. To Signal Processing for Comp. Engineers

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Intro. To Signal Processing for Comp. Engineers	CENG 384	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)	Hakan Çağlar, Ascc. Prof.						
Course objective	The concept of sampling of continuous-time signals to produce discrete-time signals and the importance and application of the Nyquist sampling theorem. Understand discrete Fourier transforms (DFT) and be able to use them to characterize discrete-time signals. Z-transforms of discrete-time signals. The concepts of linearity, causality, and stability. Linear time-invariant discrete-time systems in time domain use of convolution (impulse response) and difference equations, and in frequency domain use of discrete-time Fourier transforms (frequency response) and z-transforms (transfer functions). Know how to represent discrete-time systems using block diagrams. Techniques for implementation of discrete-time systems. Understand the basic concepts of infinite-impulse-response digital filters (IIR), finite impulse-response digital filters (FIR)and their application areas. Know how to design finite- and infinite impulse response filters. The concept of the fast Fourier transforms (FFT). Image & speech application of DSP.						
Course Content	1- Discrete -Time Signals & Systems 2- Linear Time Invariant Systems, Sampling Theorem, Nyquist Rate 3- Frequency Domain Representation of Discrete-Time Signals & Systems 4- Z-Transform, Inverse Z-Transform and its applications 5- Block Transform & Signal Flow Graph Representation of LTI Systems, Difference Equations 6- Digital Filter Design, IIR & FIR Filters and their applications 7- Discrete Fourier Transform (DFT) & Fast Fourier Transform (FFT) 8- Linear Convolution of two Signals, Circular convolution with Aliasing 9- Image coding applications and subband QMF coding (Wavelet Transforms)						
References	Discrete-Time Signal Processing, 3rd edition, Alan V. Oppenheim and Ronal W. Schafer, 2013 Pearson Education ISBN10: 1292025727						

Learning outcomes	After taking this course students will be able to; 1- Understand basics of discrete-time signal, convolution, impulse and frequency response concepts for linear, time-invariant (LTI) systems, realization of LTI systems and discrete-time Fourier transform and basic properties of these. 2- Understands periodic sampling of analog signals and the relation between Fourier transforms of the sampled analog signal and the resulting sampled discrete-time signal. Nyquist sampling theorem and its applications. 3- Z-Transform and inverse Z- Transform, and their applications. Solution for difference equation by using z-Transforms. 4- Understands signal flow graph and block diagram representations of difference equations that realize digital filters, for IIR filter realization & for FIR filter realization. 5- Understands definitions and basic properties of forward and inverse discrete Fourier transform and their computation by fast algorithms, namely FFT. 6- Learns basic digital signal processing application on 1-D speech signal, 2-D image and 3-D video signals.

Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Introduction to Digital Signal Processing: Overview of DSP, analog vs. digital signals, applications (audio, image, communications), Binary, gray level and color images, speech signal, video and frequency spectrum of signals.
2. Week	Discrete-Time Signals and Systems, Discrete-time signals (sequences), classification (periodic, aperiodic, energy, power), basic operations (shifting, scaling, folding). Nyquist & sampling theorem. Resolution and quantization bit rates.
3. Week	Linear Time-Invariant (LTI) Systems: Properties of LTI systems (linearity, time-invariance, causality), convolution sum, impulse response. Input output relation of LTI systems.
4. Week	Z-Transform: Definition of Z-transform, region of convergence (ROC), properties, inverse Z-transform.
5. Week	Z-Transform Applications: Transfer functions, Convolution theorem and Z transform relations, system stability, pole-zero analysis, difference equations and solutions.
6. Week	Disctrete Fourier Series representation of periodic funtions, Fourier Series coefficients, and its inverse transform. Approximation error analysis and orthogonal functional representations.
7. Week	Frequency Analysis of SignalsDiscrete-time Fourier transform (DTFT), properties, frequency response of LTI systems. Discrete Fourier Transform (DFT) definition, properties (linearity, circular convolution), relationship to DTFT. Fast Fourier Transform (FFT): FFT algorithms, computational efficiency, applications.
8. Week	Midterm Exam
9. Week	Digital Filter Design - FIR Filters: Finite Impulse Response (FIR) filters, design methods (windowing, frequency sampling), linear phase.
10. Week	Digital Filter Design - IIR Filters: Infinite Impulse Response (IIR) filters, design methods (Bilinear transformation, impulse invariance), analog-to-digital filter mapping.

11. Week	Filter Implementation and Structures: Filter realization (direct form, cascade, parallel), quantization effects, coefficient sensitivity.
12. Week	Multirate Signal Processing: Decimation, interpolation, sampling rate conversion, subband signal decomposition.
13. Week	Applications of DSP: Image coding, Wavelet transforms and QMF filter banks, DSP in audio processing, image processing, or communications (e.g., modulation).
14. Week	Course Wrap-Up & homework or mini project presentations, course review.
15. Week	Final Exam

Course Requirements

Assessment Method

Description	**%**	**Due date**
Term project	**100%**	
Basic Digital Signal Processing application on speech & image data (Quantization error, sampling rate, aliasing)	**15%**	
DFT of discrete signal, and Inverse DFT applications	**20%**	
High pass FIR filter edge detection (1-D & 2-D)	**15%**	
Low pass FIR filter application for smoothing	**15%**	
Presentation of Projects (Max 25 minutes per presentation.)	**25%**	
Attendance	**10%**	

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	%5
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	2	%10
Presentation	1	%5
Project	1	%20
Seminar	0	%0
Mid-term Exams	1	%25
Final Exam	1	%40
Total	20	%100
Contribution of semester Works to success points	21	%60
Contribution of final exam to success points	1	%40
Total	22	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	3	42
Presentation / Seminar Preparation			
Project	1	15	15
Homework assignment	4	5	20
Midterms (Study duration)	1	15	15
Final Exam (Study duration)	1	20	20
Total Workload			154
Total Workload/30 hours			5.15
ECTS			5.00

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUT COMES	1	a	X	X	X	x	x	
		b		X	X	x	x	
		c			X	x	x	
	2	a						
		b						
		c						
	3	a						x
		b						x
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
COMPUTER ENGINEERING DEPARTMENT

SENG 491 - Graduation Project 1

Course Information

	Code	Semester	Theory (hours/ week)	Application (hours/ week)	Laboratory (hours/ week)	National Credit	ECTS
Graduation Project - 1	SENG 491	Fall	3	2	0	4	5
Prerequisites							
Course Language	English						
Course Type	Compulsory						
Mode of Delivery (face to face, distance learning)	Face to face, distance learning						
Learning and teaching strategies	Project, discussion, presentation and submission.						
Instructor (s)	Supervisor						
Course objective	Students will plan a project due to Software Management Life Cycle Processes, Identify a problem, Determine Requirements, make a plan and analysis of the problem/project, prepare a system design, decomposing the system and address the design goals Finaly prepare an SRS and present it.						
Course Content	Students are expected to apply knowledge and experience gained during their undergraduate studies to design and implement a solution for a software problem/project. As the first part of their graduation projects, students design a system, process, application, or product under real-world constraints and requirements in						

	CENG 491 course for design. Then the students then implement solutions to those problems in the CENG 492 course for implementation.
References	Related books, documents
Learning outcomes	After taking this course, students will be able to; 1. Define, formulate, and analyze complex engineering problems considering the UN Sustainable Development Goals relevant to the problem being addressed.(PÇ.2abc) 2. Conduct literature research to investigate complex engineering problems, (PÇ.5a) 3. Develop knowledge of the impacts of engineering practices on society, health and safety, economy, sustainability, and the environment, within the context of the UN Sustainable Development Goals. (PÇ.6a) 4. Work effectively as a team member or individually as well as on the same disciplinary teams (face-to-face, remote, or hybrid), (PÇ.8a) 5. Communicate effectively, both verbally and in writing, on technical issues, considering the differences (education, language, profession, etc.) of the target audience, (PÇ.9ab) 6. Learn independently and continuously, be able to adapt to new and developing technologies, develop a lifelong learning skill that includes questioning and thinking about technological changes. a

Subjects by weeks

Weeks	**Subjects**
1. Week	Project Study (Project Identification)
2. Week	Project Study (Project Identification)
3. Week	Project Study (Project Identification)
4. Week	Project Study (Project Identification)
5. Week	Project Study (Requirements Elicitation)
6. Week	Project Study (Requirements Elicitation)
7. Week	Project Study (Requirements Elicitation)

8. Week	Project Study (Literature Review)
9. Week	Project Study (Literature Review)
10. Week	Project Study (Analysis & Design)
11. Week	Project Study (Analysis & Design)
12. Week	Project Study (Analysis & Design)
13. Week	Project Study (Analysis & Design)
14. Week	Project Study (Analysis & Design)
15. Week	Project Study (Analysis & Design)
16. Week	Presentation and project draft submission

Assessment Method

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

Workload and ECTS Calculation

Activities	**Number**	**Duration (hour)**	**Total Workload**
Course Duration (x14)	14	5	70
Laboratory			
Application			
Specific practical training			
Field activities	3	3	9
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)			
Presentation / Seminar Preparation	1	10	10
Project	1	60	60
Homework assignment			
Quiz			
Midterms (Study duration)			
Final Exam (Study duration)			
Total Workload	149		
Total Workload/30 hours	4,97		
ECTS	5,00		

Form VIIb (English):

PROGRAM OUTCOMES - THE COURSE LEARNING OUTCOMES MATRIX

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUTCOMES	1	a						
		b						
		c						
	2	a	X					
		b	X					
		c	X					
	3	a						
		b						
	4	a						
		b						
		c						
	5	a		X				
		b						
	6	a			X			
		b						
	7	a						
		b						
	8	a				X		
		b						
	9	a					X	
		b					X	
	10	a						
		b						
	11	a						X
		b						X
		c						X
	12							
	13	a						
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
COMPUTER ENGINEERING DEPARTMENT

CCE 401 - Critical Thinking, Creativity, Entrepreneurship

Course Information

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Critical Thinking, Creativity, Entrepreneurship	CCE 401	Fall	2	0	0	2	2
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)	Assoc. Prof. Yavuz Selim ÖZDEMİR						
Course Objective	This course aims to give students essential knowledge and skills in critical thinking, creativity, and entrepreneurship. Students will learn to view events from different perspectives, question assumptions, develop innovative ideas, turn those ideas into viable business models, and create value. By the end of the course, students will be prepared with problem-solving skills, analytical thinking, creative production, and an entrepreneurial mindset.						
Course Content	This course aims to enhance students' critical thinking, creativity, and entrepreneurial skills; it covers problem-solving, developing innovative ideas, creating business models, and hands-on project work.						

References	1. Christopher P. Dwyer – Critical Thinking: Conceptual Perspectives and Practical Guidelines (Cambridge University Press, 2017) 2. Suzanne Mawson – Entrepreneurial Thinking: Mindset in Action (SAGE Publications, 2024)
Learning Outcomes	After taking this course students will be able to; 6. Information on the impact of engineering applications on society, health and safety, the economy, sustainability, and the environment within the framework of the UN Sustainable Development Goals. 7. Acting in accordance with engineering professional principles, knowledge of ethical responsibility. 8. Awareness of acting impartially without discrimination in any matter and embracing diversity. 9. The ability to work effectively as a team member or leader in multidisciplinary teams (face-to-face, remote, or hybrid). 10. Knowledge of workplace applications such as project management and economic feasibility analysis. 11. Awareness of entrepreneurship and innovation. 12. The ability to learn independently and continuously. 13. The ability to adapt to new and emerging technologies. 14. Lifelong learning skills that include critical thinking about technological change.

Form IVb (English):

Subjects by weeks

Week	**Topics (tentative)**
1	The Role of Engineering in Society and Sustainability
2	Sustainable Engineering and Environmental Impacts
3	Ethical and Professional Responsibility
4	Impartiality, Diversity, and Inclusion
5	Teamwork and Leadership
6	Project Management and Economic Feasibility
7	Entrepreneurship and Innovation
	Midterm
8	New Technologies and Adaptation
9	Lifelong Learning and Critical Thinking
10	Project Work and Final Presentations
11	Project Work and Final Presentations
12	Project Work and Final Presentations
13	Project Work and Final Presentations
14	Project Work and Final Presentations
	Final

Form Vb (English):

Assessment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	3	%45
Presentation	0	%0
Final Project	1	%55
Seminar	0	%0
Mid-term Exam	0	%0
Final Presentation	1	%55
Total	17	%100
Contribution of semester Works to success points	3	%45
Contribution of the final exam to success points	1	%55
Total	17	%100

Form VIb (English):

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)	14	1	14
Presentation / Seminar Preparation			
Project			
Homework assignment	3	4	12
Midterm (Study duration)	0	0	0
Final Presentation (Study duration)	1	6	6
Total Workload			60
Total Workload/30 hours			2.00
ECTS			2.00

Form VIIb (English):

PROGRAM OUTCOMES - THE COURSE LEARNING OUTCOMES MATRIX

			COURSE LEARNING OUTCOMES								
			LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9
PROGRAM OUTCOMES	1	a									
		b									
		c									
	2	a									
		b									
		c									
	3	a									
		b									
	4	a									
		b									
		c									
	5	a									
		b									
	6	a	X								
		b									
	7	a		X							
		b			X						
	8	a									
		b				X					
	9	a									
		b									
	10	a					X				
		b						X			
	11	a							X		
		b								X	
		c									X
	12										
	13	a									
		b									
	14	a									
		b									
		c									
	15										

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
COMPUTER ENGINEERING DEPARTMENT

SENG 492 - Graduation Project 2

Course Information

	Code	Semester	Theory (hours/ week)	Application (hours/ week)	Laboratory (hours/ week)	National Credit	ECTS
Graduation Project - 2	SENG 492	Spring	3	2	0	4	5
Prerequisites							
Course Language	English						
Course Type	Compulsory						
Mode of Delivery (face to face, distance learning)	Face-to-face, distance learning						
Learning and teaching strategies	Project, discussion, presentation, and submission.						
Instructor (s)	Supervisor						
Course objective	Students will plan a project due to Software Management Life Cycle Processes, Identify a problem, Determine Requirements, make a plan and analysis of the problem/project, prepare a system design, decomposing the system and address the design goals Finaly prepare an SRS and present it.						
Course Content	Students are expected to apply knowledge and experience gained during their undergraduate studies to design and implement a solution for a software problem/project. As the first part of their graduation projects, students design a system, process, application, or product under real-world constraints and requirements in						

	SENG 491 course for design. Then the students then implement solutions to those problems in the SENG 492 course for implementation.
References	Related books, documents
Learning outcomes	After taking this course, students will be able to; 1. Define, formulate, and analyze complex engineering problems considering the UN Sustainable Development Goals relevant to the problem being addressed. (PÇ.2abc) 2. Design innovative solutions to complex engineering problems, including the development of systems, processes, devices, or products that address current and future needs within realistic constraints and conditions. (PÇ.3ab) 3. Select and apply appropriate methods, resources, and modern engineering and computing tools — including modeling and estimation techniques — for analyzing and solving complex engineering problems, with an understanding of their limitations (PÇ.4abc) 4. Investigate complex engineering problems by conducting literature research, designing and executing experiments, collecting and analyzing data, and interpreting the results. (PÇ.5ab) 5. Get the knowledge of the impacts of engineering practices on society, health and safety, economy, sustainability, and the environment, within the context of the UN Sustainable Development Goals (PÇ.6a) 6. Communicate effectively, both verbally and in writing, on technical matters, considering the differences (education, language, profession, etc.) of the target audience, and work effectively as a team member or leader individually and on the same discipline teams (in-person, remote, or hybrid). (PÇ.8a9ab) 7. Learn independently and continuously, adapting to new and developing technologies, and thinking critically about technological changes is a lifelong learning skill.(PÇ.11abc)

Subjects by weeks

Weeks	Subjects
1. Week	Project Study (Project Identification)
2. Week	Project Study (Project Identification)
3. Week	Project Study (Project Identification)
4. Week	Project Study (Project Identification)
5. Week	Project Study (Requirements Elicitation)
6. Week	Project Study (Requirements Elicitation)
7. Week	Project Study (Requirements Elicitation)
8. Week	Project Study (Literature Review)
9. Week	Project Study (Literature Review)
10. Week	Project Study (Analysis & Design)
11. Week	Project Study (Analysis & Design)
12. Week	Project Study (Analysis & Design)
13. Week	Project Study (Analysis & Design)
14. Week	Project Study (Analysis & Design)
15. Week	Project Study (Analysis & Design)
16. Week	Presentation and project draft submission

Assessment Method

Semester Works	Number	Contribution
Attendance		
Laboratory		
Application		
Fieldwork		
Practice		

Homework Assessment		
Quiz		
Presentation	1	40%
Project	1	60%
Seminar		
Mid-term Exams		
Final Exam		
Total	2	100%
Contribution of semester Works to success points		
Contribution of final exam to success points		
Total	2	100%

Workload and ECTS Calculation

Activities	**Number**	**Duration (hour)**	**Total Workload**
Course Duration (x14)	14	5	70
Laboratory			
Application			
Specific practical training			
Field activities	3	3	9
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)			
Presentation / Seminar Preparation	1	10	10
Project	1	60	60
Homework assignment			
Quiz			
Midterms (Study duration)			
Final Exam (Study duration)			
Total Workload	149		
Total Workload/30 hours	4,97		
ECTS	5,00		

Form VIIb (English):

PROGRAM OUTCOMES - THE COURSE LEARNING OUTCOMES MATRIX

				COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6	LO7
PROGRAM OUTCOMES	1	a							
		b							
		c							
	2	a	X						
		b	X						
		c	X						
	3	a		X					
		b		X					
	4	a			X				
		b			X				
		c			X				
	5	a				X			
		b				X			
	6	a					X		
		b							
	7	a							
		b							
	8	a						X	
		b							
	9	a						X	
		b						X	
	10	a							
		b							
	11	a							X
		b							X
		c							X
	12								
	13	a							
		b							
	14	a							
		b							
		c							
	15								

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE

SENG 490 - Long Term Practice

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/ week)	Application (hours/ week)	Laboratory (hours/ week)	National Credit	ECTS
Long Term Practice	CENG,SENG, EEE, IE 490	Spring	0	5 hrs.	0	16	25
Prerequisites	• Those who have completed 190 ECTS of theoretical courses in the first 7 semesters of the undergraduate program • to have taken the graduation project 1						
Course Language	English						
Course Type	Compulsory						
Mode of Delivery	• Students must be present at the institution where they intern for at least 4 days a week. • Students can come to the university to take a 5 ECTS course for a maximum of 1 day per week. • The minimum actual work required for the compulsory internship is 56 days.						
Learning and teaching strategies							
Instructor (s)							
Course objective	o To build collaborative relationships with colleagues and customers of diverse cultural, racial, age, gender, religious, lifestyle, and point of view backgrounds o To enable them to develop skills related to positions and career goals appropriate to their professional field o Understand the strengths and weaknesses of the knowledge and experience gained in undergraduate education o To gain the ability to express themselves verbally and in writing during the internship and the evaluation phase o To learn about the areas required for professional development by traveling between them and thus to be able to determine the appropriate area for themself o Evaluating the opportunities in the internship workplace and obtaining job opportunities after graduation o To work within a team structure and to negotiate and manage conflicts o Learning to work collaboratively and efficiently to solve problems, complete tasks, and achieve goals o To be able to adapt effectively to new and emerging technologies						
Course Content							
References							
Learning outcomes	After taking this course, students will be able to; 1. Gain the ability to work effectively as a team member or leader, individually and in multidisciplinary teams (face-to-face, distance, or mixed) 2. Gain the ability to communicate effectively ORALLY on technical issues, considering the differences of the target audience (such as education, language, profession) 3. Gain the ability to communicate effectively IN WRITING technical issues, considering the differences of the target audience (such as education, language, profession) 4. Gain awareness about entrepreneurship and innovation						

Subjects by weeks

Weeks	Subjects
1. Week	Meeting with the supervisor and other colleagues, getting to know the organization where the internship will take place
2. Week	Working effectively as a team member or leader, both individually and as part of multidisciplinary teams in project/s
3. Week	
4. Week	
5. Week	
6. Week	Participation in seminars on entrepreneurship and innovation, training courses, and so on.
7. Week	
8. Week	
9. Week	
10. Week	
11. Week	
12. Week	
13. Week	Completing the projects and tasks related to the long-term practice
14. Week	Holding an evaluation with the supervisor

Assessment Method

Semester Works	Number	Contribution
Attendance	14	0%
Laboratory	0	0%
Application	56	0%
Fieldwork	0	0%
Practice	0	40%
Homework Assessment	0	0%
Quiz	0	0%
Presentation	1	30%
Project	0	30%
Seminar	0	0%
Mid-term Exams	0	0%
Final Exam	1	0%
Total		100%
Contribution of semester work to success points		0%
Contribution of the final exam to success points		0%
Total		100%

Workload and ECTS Calculation

Activities	Number	Duration (hours)	Total Workload
Course Duration (x14)	14	8 x 4	448

Laboratory	0	0	0
Application	56	4	224
Specific practical training	0	0	0
Field activities	0	0	0
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)			
Presentation / Seminar Preparation	1	4	4
Project	1	14	14
Homework assignment	0	0	0
Quiz	0	0	0
Midterms (Study duration)	0	0	0
Final Exam (Study duration)	1	56	56
Total Workload	746		
Total Workload/30 hours	24.8		
ECTS	25		

Program Learning Outcomes - Course Learning Outcomes Matrix

			COURSE LEARNING OUTCOMES			
			LO1	LO2	LO3	LO4
PROGRAM OUTCOMES	1	a				
		b				
		c				
	2	a				
		b				
		c				
	3	a				
		b				
	4	a				
		b				
		c				
	5	a				
		b				
	6	a				
		b				
	7	a				
		b				
	8	a				
		b	X			
	9	a		X		
		b			X	
	10	a				
		b				X
	11	a				
		b				

		c				
	12					
	13	a				
		b				
	14	a				
		b				
		c				
	15					

TECHNICAL ELECTIVE COURSES

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING
INFORMATION SYSTEMS ENGINEERING DEPARTMENT

ISE 443 - Cyber Security-1

Course Information

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Cyber Security-1	ISE 443	Fall	3	0	0	3	5
Prerequisites	None						
Course Language	English						
Course Type	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)	Assist.Prof. Dr. Hakan Yıldırım						
Course objective	The objective of this course is to introduce the fundamental principles and practices of cybersecurity. This course covers core concepts such as the CIA Triad (Confidentiality, Integrity, Availability), common cyber threats, cryptographic techniques, authentication and access control methods, and basic network security mechanisms including firewalls and VPNs. Another purpose of this course is to provide students with hands-on experience through case studies and practical exercises. By the end of the course, students will be able to understand, analyze, and apply essential cybersecurity methods to protect systems and networks against common threats.						
Course Content	The purpose of this course is to introduce you to the fundamental concepts and practices of cybersecurity, a field that is central to protecting modern information systems. At the end of the course, you will be equipped with the basic tools and methodologies to secure computer systems and networks against common cyber threats. The course will be structured around theoretical lectures combined with practical case studies and exercises, enabling you to gain hands-on experience in applying cybersecurity techniques. The focus will include topics such as the CIA Triad, cyber threats and attack vectors, cryptographic methods, authentication and access control, network security, web application security, operating system security, and mobile/IoT security. Students will also work on a final project to develop a comprehensive cybersecurity plan for a real-world system.						

References	1. Yıldırım, Hakan & Ünal, Cihan. *Siber Güvenlik Rehberi – Tehditten Çözüme*. 1. Basım, Nobel Akademik Yayıncılık, Ankara, Temmuz 2025. ISBN: 978-625-386-484-2. 2. P.W. Singer & Allan Friedman, *Cybersecurity and Cyberwar: What Everyone Needs to Know*, Oxford University Press, 2014. 3. William Stallings, *Network Security Essentials: Applications and Standards*, 6th Ed., Pearson, 2023. 4. Ross Anderson, *Security Engineering: A Guide to Building Dependable Distributed Systems*, 3rd Ed., Wiley, 2020. 5. Dafydd Stuttard & Marcus Pinto, *The Web Application Hacker's Handbook*, 2nd Ed., Wiley, 2011. 6. Michael Sikorski & Andrew Honig, *Practical Malware Analysis*, No Starch Press, 2012. 7. Bruce Schneier, *Applied Cryptography: Protocols, Algorithms, and Source Code in C*, 2nd Ed., Wiley, 2015.
Learning outcomes	After taking this course students will be able to know; 1. Introduction to the fundamental principles of cybersecurity and the CIA Triad (Confidentiality, Integrity, Availability) 2. Identification of common cyber threats, attack vectors, and social engineering techniques 3. Basic implementation of cryptographic methods (symmetric, asymmetric, hashing, digital signatures) 4. Application of authentication and access control mechanisms (passwords, MFA, RBAC) 5. Configuration of fundamental network security tools (firewalls, VPNs, IDS/IPS) 6. Recognition and mitigation of common web application vulnerabilities (OWASP Top 10) 7. Evaluation of real-world cyber incidents and proposal of effective mitigation strategies 8. Development of a comprehensive cybersecurity plan through hands-on case studies and projects.

Form IVb (English): Subjects by weeks

Week	Topic	Book	Theory+Lab
1	Introduction to Cybersecurity, CIA Triad, threat actors, motivations	Yıldırım&Unal (1st ref)	3 hrs.
2	Cyber Threats and Attack Vectors (malware, phishing, DDoS, insider threats, social engineering)	"	3 hrs.
3	Cryptography I – Symmetric Encryption, Hash Functions	"	3 hrs.
4	Functions	"	3 hrs.
5	Cryptography II – Asymmetric Encryption, Digital Signatures, PKI	"	3 hrs.
6	Authentication Mechanisms (passwords, biometrics, MFA)	"	3 hrs.

7	Access Control (RBAC, ACLs, authorization vs. authentication)	“	3 hrs.
	Midterm		
8	Network Security I – Firewalls, IDS, IPS	“	3 hrs.
9	Network Security II – VPNs, SSL/TLS	“	3 hrs.
10	Web Application Security I – OWASP Top 10 (SQLi, XSS, CSRF)	“	3 hrs.
11	Operating System Security – Windows, Linux, macOS hardening	“	3 hrs.
12	Mobile and IoT Security I – App Permissions, IoT Vulnerabilities	“	3 hrs.
13	Mobile and IoT Security II – IoT Device Security, Secure Communications	“	3 hrs.
14	Final Project Presentations & Comprehensive Review	“	3 hrs.
	Final		

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	2	%0
Presentation	0	%0
Project	1	%0
Seminar	0	%0
Mid-term Exams	1	%40
Final Exam	1	%60
Total	19	%100
Contribution of semester Works to success points	4	%50
Contribution of the final exam to success points	1	%50
Total	19	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

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

Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation)	14	4	56
Presentation / Seminar Preparation			
Project			
Homework assignment	2	8	16
Midterm (Study duration)	1	12	12
Final Exam (Study duration)	1	16	16
Total Workload			142
Total Workload/30 hours			4.73
ECTS			5.00

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUTCOMES	1	a						
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							

	13	a						
		b						
	14	a						
		b						
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING
INFORMATION SYSTEMS ENGINEERING DEPARTMENT

ISE 444 - Cyber Security II

Course Information

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Cyber Security-2	ISE 444	Fall	3	0	0	3	5
Prerequisites	None						
Course Language	English						
Course Type	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)	Assist.Prof. Dr. Hakan Yıldırım						
Course objective	The objective of this course is to explore advanced principles and practices of cybersecurity. This course covers topics such as risk management, ethical hacking, penetration testing, malware analysis, data privacy regulations (e.g., GDPR), cloud security, and emerging technologies including AI, blockchain, and quantum computing. Another purpose of this course is to provide students with deeper hands-on experience through penetration test simulations, malware reverse engineering, and real-world case study analyses. By the end of the course, students will be able to design, implement, and evaluate advanced cybersecurity strategies to protect complex systems and infrastructures against evolving threats.						
Course Content	The purpose of this course is to introduce you to advanced concepts and practices in cybersecurity, which are essential for protecting modern and complex information systems. At the end of the course, you will be equipped with the tools and methodologies to perform penetration testing, conduct malware analysis, develop incident response strategies, and address security challenges in cloud and emerging technologies. The course will be structured around theoretical lectures combined with practical simulations, reverse engineering exercises, and real-world case studies, enabling you to gain hands-on experience in advanced cybersecurity techniques. The focus will include topics such as risk management, ethical hacking, penetration testing, malware analysis, data privacy and GDPR, cloud security, and future trends including AI, blockchain, and quantum computing. Students will also work on a final project to develop a comprehensive defense strategy or conduct an in-depth analysis of a real-world cyber-attack.						
References	1. Yıldırım, Hakan & Ünal, Cihan. *Siber Güvenlik Rehberi – Tehditten Çözüme*.						

	1. Basım, Nobel Akademik Yayıncılık, Ankara, Temmuz 2025. ISBN: 978-625-386-484-2. 2. P.W. Singer & Allan Friedman, *Cybersecurity and Cyberwar: What Everyone Needs to Know*, Oxford University Press, 2014. 3. William Stallings, *Network Security Essentials: Applications and Standards*, 6th Ed., Pearson, 2023. 4. Ross Anderson, *Security Engineering: A Guide to Building Dependable Distributed Systems*, 3rd Ed., Wiley, 2020. 5. Dafydd Stuttard & Marcus Pinto, *The Web Application Hacker's Handbook*, 2nd Ed., Wiley, 2011. 6. Michael Sikorski & Andrew Honig, *Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software*, No Starch Press, 2012. 7. Peter Szor, *The Art of Computer Virus Research and Defense*, Addison-Wesley, 2005. 8. Bruce Schneier, *Applied Cryptography: Protocols, Algorithms, and Source Code in C*, 2nd Ed., Wiley, 2015.
Learning outcomes	After taking this course students will be able to know; 1. Perform advanced risk assessments and develop incident response plans 2. Conduct ethical hacking and penetration testing following professional and legal standards 3. Analyse and reverse-engineer malware using both static and dynamic techniques 4. Apply GDPR and data privacy principles in organizational security strategies 5. Design and implement secure solutions for cloud environments 6. Evaluate and address emerging cybersecurity challenges related to AI, blockchain, and quantum computing 7. Investigate high-profile cyber incidents and derive effective defense strategies 8. Develop and present a comprehensive defense plan or in-depth analysis of a real-world cyber-attack through hands-on projects

Form IVb (English): Subjects by weeks

Week	Topic	Book	Theory+Lab
1	Cybersecurity Risk Management I – Risk assessment and analysis, security policies	Yıldırım&Unal (1st ref)	3 hrs.
2	Cybersecurity Risk Management II – Risk mitigation techniques, incident response planning	"	3 hrs.
3	Ethical Hacking and Penetration Testing I – Principles, legal aspects, reconnaissance and scanning	"	3 hrs.

4	Ethical Hacking and Penetration Testing II – Exploitation, post-exploitation, reporting findings	“	3 hrs.
5	Malware Analysis and Reverse Engineering I – Malware types, static analysis	“	3 hrs.
6	Malware Analysis and Reverse Engineering II – Dynamic analysis, reverse engineering basics	“	3 hrs.
7	GDPR and Data Privacy I – Overview of GDPR, rights of data subjects	“	3 hrs.
	Midterm		
8	GDPR and Data Privacy II – Compliance requirements, data breach notification	“	3 hrs.
9	Cloud Security – Challenges, secure architecture design	“	3 hrs.
10	Emerging Threats and Future Trends I – AI, machine learning, blockchain security	“	3 hrs.
11	Emerging Threats and Future Trends II – Quantum computing and cryptography	“	3 hrs.
12	Cybersecurity Case Studies I – High-profile attacks (Equifax, SolarWinds), lessons learned	“	3 hrs.
13	Cybersecurity Case Studies II – Defense strategies and incident response planning	“	3 hrs.
14	Final Project Presentations & Comprehensive Review	“	3 hrs.
	Final Exam		

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	2	%0
Presentation	0	%0
Project	1	%0
Seminar	0	%0
Mid-term Exams	1	%40
Final Exam	1	%60
Total	19	%100
Contribution of semester Works to success points	4	%50
Contribution of the final exam to success points	1	%50
Total	19	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation)	14	4	56
Presentation / Seminar Preparation			
Project			
Homework assignment	2	8	16
Midterm (Study duration)	1	12	12
Final Exam (Study duration)	1	16	16
Total Workload			142
Total Workload/30 hours			4.73
ECTS			5.00

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

			COURSE LEARNING OUTCOMES

			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUTCOMES	1	a						
		b	X					
		c	x				X	X
	2	a						
		b						
		c						
	3	a						
		b						
	4	a		X	X			
		b				X		
		c		X				X
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a						
		b	X		X			X
		c						
	15							

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

SENG 331 - Modeling and Simulation with Python

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Modeling and Simulation with Python	SENG 331	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)	M. Nedim ALPDEMİR, Assoc. Prof. Dr.						
Course objective	The objective of this course is to introduce undergraduate students to the fundamental concepts, methodologies, and practical techniques of modeling and simulation, with a strong hands-on focus, using the Python SimPy library to analyze real-world systems through case studies.						
Course Content	9. Introduction to modeling and simulation concepts 10. Basics of random input generation 11. Discrete-event modeling logic 12. SimPy fundamentals and practical coding 13. Building, running, and validating simulation models 14. Case studies in manufacturing, service, and logistics systems 15. Output analysis and reporting						

References	5. Simulation Modeling and Analysis, Averill M. Law, McGraw Hill 2015, 5th Ed. *(Main Text Book)* 6. Foundations and Methods of Stochastic Simulation, Bary L. Nelson and Linda Pei, Springer, 2021, 2nd Ed.
Learning outcomes	By the end of the course, students will be able to: 1. Understand the role of simulation in engineering and decision-making. 2. Develop conceptual models for real-world systems. 3. Code discrete-event simulations in Python using SimPy. 4. Model randomness and generate input data for simulations. 5. Conduct and interpret simulation experiments. 6. Analyze and present simulation results in case studies.

Form IVb (English): Subjects by weeks

Weeks	Subjects
17. Week	**Introduction to Simulation & Modeling:** The meaning of simulating a conceptual model in a digital setting
18. Week	**Conceptual Modeling:** System boundaries, states, events, flows. Small group brainstorming
19. Week	**Random Number and random variate Generation**: Uniform RNG, properties, tests etc.
20. Week	**Introduction to SimPy resources and proceses**: Install/setup, first processes, events. Queues, resources, priority queues. Coding exercise
21. Week	**Modeling input distributions:** Data collection, distribution fitting, sampling. Code practicals
22. Week	**Building a Simple Case Study (e.g. Queueing System):** Hands-on introduction, Queueing sys. Tutorials with SimPy
23. Week	**Verification & Debugging**: Code testing, logging events. Group discussion.
24. Week	Midterm exam

25. Week	**Output Analysis Basics**: Warm-up period, averages, variance. In-code calculations..
26. Week	**Simulation Experiment Design**: Varying parameters, replication. Hands-on
27. Week	**Intermediate SimPy Modeling**): Complex interactions, nested resources.
28. Week	**Case Study: Manufacturing or Service System:** Instructor-led implementation.
29. Week	**Verification and Validation**: Conceptual and operational validation
30. Week	**Student Case Study Projects:** Group work, instructor feedback.
31. Week	**Student Presentations & Review:** Student presentations or review session
32. Week	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	%5
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	0	%0
Presentation	0	%0
Project	1	%25
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	18	%100
Contribution of semester Works to success points	3	%60
Contribution of final exam to success points	1	%40
Total	18	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

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

Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	5	70
Presentation / Seminar Preparation			
Project	14	2	28
Homework assignment			
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			144
Total Workload/30 hours			4.88
ECTS			5.00

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

			COURSE LEARNING OUTCOMES					
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUTCOMES	1	a						
		b	X					
		c	x				X	X
	2	a						
		b						
		c						
	3	a						
		b						
	4	a		X	X			
		b				X		
		c		X				X
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						

	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a						
		b	X		X			X
		c						
	15							

ANKARA SCIENCE UNIVERSITY

FACULTY OF ENGINEERING AND ARCHITECTURE

COMPUTER ENGINEERING DEPARTMENT

Seng 420 - Advanced Programming

Course Information

	Code	Semester	Theory (hours/ week)	Application (hours/ week)	Laboratory (hours/ week)	National Credit	ECTS
Advanced Programming	Seng 420	Spring	3	0	0	3	5
Prerequisites	CENG xxx						
Course Language	English						
Course Type	Technical Elective						
Mode of Delivery (face to face, distance learning)	Face to face						
Learning and teaching strategies	Lecturing, discussion and submission.						
Instructor (s)							
Course objective	• Java Object Oriented Programming (OOP) concepts review • UML concepts, mainly class diagrams • Design Principles • Generic programming • Network programming • Multithreading • Parallel programming, Nvidia, GPU, CUDA						

	• Java collections framework
Course Content	• Details of OOP • Multithreading • Network programming concepts • Parallel programming concepts • Java collections
References	1. Big Java Late Objects, Cay Horstmann 2. Lecture Notes
Learning outcomes	After taking this course students will be able to; 1) Use encapsulation, inheritance and polymorphism in their programs 2) Use design principles in their programs 3) Write client and server applications running on computer networks 4) Use parallel programming techniques in their programs

Subjects by weeks

Weeks	**Subjects**
1. Week	Review of OOP concepts
2. Week	UML diagrams and Extracting class relationships from code
3. Week	Designing software using UML and generating code from UML
4. Week	Software design principles
5. Week	Generic programming
6. Week	Network programming
7. Week	Network programming
8. Week	Miderm Exam
9. Week	Multithreading
10. Week	Multithreading examples

11. Week	Parallel programming concepts
12. Week	GPU structure
13. Week	Parallel programming on GPU
14. Week	Java collections framework
15. Week	Project presentations
16. Week	Final Exam

Course Requirements

1- CENG 101

2- CENG 102

Assessment Method

Description	**%**	**Due date**
Term project	**20%**	
Midterm	**30%**	
Final	**40%**	
Attendance	**10%**	

Form Vb (İngilizce): Assessment Method

Semester Works	**Number**	**Contribution**
Attendance	14	%10
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	1	%0
Presentation	0	%0
Project	1	%20
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	20	%100
Contribution of semester Works to success points	21	%60
Contribution of final exam to success points	1	%40
Total	22	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

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

Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	3	42
Presentation / Seminar Preparation			
Project	1	20	20
Homework assignment	1	5	5
Midterms (Study duration)	1	15	15
Final Exam (Study duration)	1	20	20
Total Workload			154
Total Workload/30 hours			4.8
ECTS			5.00

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

			LO1	LO2	LO3	LO4
PROGRAM OUT COMES	1	a	X	X	X	X
		b		X	X	X
	2	a				
		b				
		c				
	3	a				
		b				
	4	a				
		b				
		c				
	5	a				
		b				
	6	a				
		b				
	7	a				
		b				
	8	a				
		b				
	9	a				
		b				
	10	a				
		b				

	11	a				
		b				
		c				
	12					
	13	a				
		b				
	14	a				
		b				
		c				
	15					

ANKARA SCIENCE UNIVERSITY
FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

CENG 424 - Systems Programming

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hrs/week)	Laboratory (hrs/week)	National Credit	ECTS
Systems Programming	CENG 424	Spring	3	0	0	3	5
Prerequisites	None						
Course Language	English						
Course Type	Elective						
Mode of Delivery	Face-to-face / Distance Education						
Learning and teaching strategies	Lectures, Problem Solving.						
Instructor (s)	Halil Özmen						
Course objective	• Basics of Unix/Linux, Unix/Linux commands and file system. • Bash shell scripting • Write and debug C programs. • Inter process communication and low level programming constructs such as pipes, threads, interrupts and sockets.						
Course Content	This course covers basics of Unix operating system, Unix filesystem, basic Unix commands, Unix bash shell, C programming language, C structures, memory management, creating processes and inter process communication, gdb debugger, make utility, makefile in Unix.						
References	1. UNIX Systems Programming: Communication, Concurrency and Threads, 2nd Ed., Kay Robbins, Steve Robbins, ISBN: 978-0134424071 2. Systems Programming, Halil Özmen						
Learning outcomes	On successful completion of this course students will be able to: 1. Understand basics of Unix/Linux and how the Unix/Linux command shell processes commands.						

	2. Understand how the Unix/Linux file systems stores information. 3. Write and debug scripts in Bash. 4. Write and debug programs in C. 5. Understand how C programs and Unix-based operating systems interface at a low level. 6. Understand inter process communication and low level programming constructs such as pipes, threads, interrupts and sockets.

Form IVb (English): Subjects by weeks

Weeks	Subjects
1	Unix basics and file system.
2	Basic Unix commands and utility programs
3	Unix file management
4	Bash shell and bash shell scripting
5	Bash shell and bash shell scripting
6	C language syntax, data types, variables, control structures, C library functions
7	Midterm Week
8	Writing functions in C, C Arrays and Strings
9	Structures in C, C pointers, dynamic memory allocation, memory management functions
10	Reading from files and writing to files in C, System Calls in C
11	Compiling and linking C programs under Unix / Linux, makefile; gdb debugger
12	Creating subprocesses, Inter Process Communication (IPC)
13	Creating subprocesses, Inter Process Communication (IPC)
14	Holiday
15	Review of course subjects

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Application	2	%10
Fieldwork	0	%0
Practice	0	%0
Quizzes	1	%5
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%35
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

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application	2	5	10
Specific practical training			

Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	4	56
Presentation / Seminar Preparation			
Project			
Quizzes	1	4	4
Midterms (Study duration)	1	10	10
Final Exam (Study duration)	1	30	30
Total Workload			152
Total Workload/30 hours			5.07
ECTS			5.00

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

COURSE LEARNING OUTCOMES								
			LO1	LO2	LO3	LO4	LO5	LO6
PROGRAM OUTCOMES	1	a						
		b						
		c						
	2	a						
		b						
		c						
	3	a						
		b						
	4	a						
		b						
		c						
	5	a						
		b						
	6	a						
		b						
	7	a						
		b						
	8	a						
		b						
	9	a						
		b						
	10	a						
		b						
	11	a						
		b						
		c						
	12							
	13	a						
		b						
	14	a						
		b						
		c						
	15							

COMMON COURSES

HIS 101- Atatürk İlkeleri ve İnkılâp Tarihi-I

DERS İZLENCESİ

Güz Dönemi

Dersin Öğretmeni:

Öğr. Gör. Merve Konak

E-mail: merve.konak@ankarabilim.edu.tr

Ders Planı:

HIS 101 Atatürk İlkeleri ve İnkılâp Tarihi-I Sınavlar MS Teams üzerinden yapılacaktır.

Dersin Amacı: Öğrencilere Türkiye Cumhuriyeti'nin yakın tarihini öğretmek, Atatürk İlkelerine bağlı gençler olarak yetişmelerini sağlamak, demokrasi bilincini geliştirerek yorum ve analiz yapabilmelerini sağlamak,

Günümüzün sorunlarına Atatürkçü yaklaşımla çözüm önerileri geliştirecek tutum ve davranışları kazandırmak.

Dersin İçeriği: 20. yy başlarında Dünya ve Osmanlı Devleti'nin çöküş nedenleri, I.Meşrutiyet, II.Meşrutiyet, Trablusgarp ve Balkan Savaşları, I. Dünya Savaşı, Kurtuluş savaşı hazırlık dönemi, Kongreler, Misak-I Milli, TBMM'nin açılması, Doğu, Güney ve Batı cepheleri, Sakarya ve Büyük Taaruz Savaşları, Lozan Barış Antlaşması, Cumhuriyet'in ilanı.

Dersin Kaynakları:

Fatma Acun(ed.), Atatürk ve Türk İnkılâp Tarihi, Siyasal Kitabevi, Ankara,2016 (Ders kitabı) İlber Ortaylı, Türkiye'nin Yakın Tarihi, Timaş Yay., İstanbul,2012

M. Kemal ATATÜRK, Nutuk, Alfa Yay.,2017

Temuçin Faik Ertan(ed.), Başlangıçtan Günümüze Türkiye Cumhuriyeti Tarihi, Siyasal Kitabevi, 7.Baskı, Ankara,2009

Haftalara Göre İşlenecek Konular:

Hafta	Konu
1	Atatürk İlkeleri ve İnkılâp Tarihi dersinin konusu, amacı ve içeriği hakkında bilgi verilmesi. Tarih Bilimi ile ilgili genel kavramlar
2	Osmanlı Coğrafyası ve stratejik önemi, Osmanlı Devleti'nin yıkılmasının iç ve dış sebepleri, 3.Selim ve II. Mahmut Dönemleri
3	Osmanlı Devleti'nin kötü gidişini önlemek için aldığı tedbirler, Yenileşme hareketleri (Tanzimat Fermanı-Islahat Fermanı-I.Meşrutiyet ve II. Meşrutiyetin İlanı)
4	XX. Yy. başlarında Osmanlı Devleti'nin sosyal, siyasi ve ekonomik durumu, Trablusgarp ve Balkan Savaşları
5	I. Dünya Savaşı (Savaşın ortaya çıkış sebepleri, Osmanlı Devleti'nin İttifak arayışı, savaştığı cepheler, savaşın sonlanması) Mondros Mütarekesinin İmzalanması
6	I.Dünya Savaşında İtilaf Devletlerinin yaptıkları gizli antlaşmalar, Mondros Mütarekesinin uygulanışı: Anadolu'nun İtilaf Devletleri tarafından işgal edilmesi, Mütareke sonrasında Osmanlı Devleti ve Anadolu'nun durumu

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7	**Milli Cemiyetler ve Milli varlığa düşman cemiyetler, Mondros Mütarekesinden sonra Mustafa Kemal Atatürk'ün faaliyetleri ve Anadolu'ya geçmesi**
8	**Ara sınav**

9	Millî Mücadeleye hazırlık dönemi, Amasya Genelgesi, Erzurum Kongresi, Sivas Kongresi, Balıkesir ve Alaşehir Kongreleri, son Osmanlı Mebusan Meclisi'nin toplanması, Misak-ı Milli'nin kabulü ve İstanbul'un işgal edilmesi
10	Mebusan Meclisi'nin dağıtılması, Ankara'da TBMM'nin açılması, TBMM Hükümeti'nin kurulması, TBMM'nin çıkardığı yasalar ve faaliyetleri,
11	Sevr Barış Antlaşması, Sevr Barış Antlaşmasının etkileri, Doğu Cephesi ve Güney Cephesindeki gelişmeler
12	Kuvay-i Milliye'nin dağıtılması, Düzenli Ordu'nun kurulması, Batı Cephesindeki gelişmeler
13	Mustafa Kemal Atatürk'e Başkomutanlık verilmesi, Tekâlif-i Milliye Emirleri, Sakarya Savaşı ve sonrasındaki gelişmeler
14	Büyük Taarruz Meydan Muharebesi, Mudanya Mütarekesi'nin imzalanması
15	Lozan Barış Antlaşması, Saltanatın kaldırılması, Cumhuriyet'in ilan edilmesi
16	Final Sınavı

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HIS 102 - Atatürk İlkeleri ve İnkılâp Tarihi-II

DERS İZLENCESİ

Güz Dönemi

Dersin Öğretmeni:

Öğr. Gör. Merve Konak

E-mail: merve.konak@ankarabilim.edu.tr

Ders Planı:

HIS 102 Atatürk İlkeleri ve İnkılâp Tarihi-II Sınavlar MS Teams üzerinden yapılacaktır.

Dersin Amacı: Öğrencilere Türkiye Cumhuriyeti'nin yakın tarihini öğretmek, Atatürk İlkelerine bağlı gençler olarak yetişmelerini sağlamak, demokrasi bilincini geliştirerek yorum ve analiz yapabilmelerini sağlamak,

Günümüzün sorunlarına Atatürkçü yaklaşımla çözüm önerileri geliştirecek tutum ve davranışları kazandırmak.

Dersin İçeriği: Saltanatın Kaldırılması, Cumhuriyet'in İlanı, Halifeliğin Kaldırılması, Atatürk Dönemi Türk İç Politika, Atatürk'ün Devrimleri, Atatürk Döneminde Türkiye'nin Dış Politikası, İkinci Dünya Savaşı ve Türk Dış Politikası, Atatürk'ün İlkeleri, Atatürk Sonrası Türkiye Cumhuriyeti.

Dersin Kaynakları:

Fatma Acun(ed.), Atatürk ve Türk İnkılâp Tarihi, Siyasal Kitabevi, Ankara,2016 (Ders kitabı)

M. Kemal ATATÜRK, Nutuk, Alfa Yay.,2017

Temuçin Faik Ertan(ed.), Başlangıçtan Günümüze Türkiye Cumhuriyeti Tarihi, Siyasal Kitabevi, 7.Baskı, Ankara,2009

İlber Ortaylı, Türkiye'nin Yakın Tarihi, Timaş Yay., İstanbul,2012

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Haftalara Göre Takip Edilmesi Gereken Konular:

Hafta	Konu
1	Saltanatın kaldırılması, Cumhuriyetin ilanı, Halk Fırkasının kurulması, Halifeliğin kaldırılması.
2	Terakkiperver Cumhuriyet Fırkası ve Şeyh Said İsyanı, İzmir suikastı, Serbest Cumhuriyet Fırkası, Menemen olayı.
3	Hukuk, Eğitim ve Kültür alanında yapılan devrimler ve düzenlemeler.
4	Ekonomik alanda ve Gündelik yaşam alanında yapılan devrimler ve düzenlemeler.
5	Türkiye Cumhuriyeti'nin 1923-1930 Dönemi: Türk-Yunan ilişkileri, Musul sorunu, Türk-Fransız ilişkileri.
6	Türkiye Cumhuriyeti'nin 1923-1930 Dönemi: Türk-İtalyan ilişkileri, Türk-Sovyet ilişkileri, Doğu devletleri ile ilişkiler.
7	Türkiye Cumhuriyeti'nin 1931-1939 Dönemi: Türkiye'nin Milletler Cemiyetine girişi, Türk-Alman ilişkileri, Balkan Antantı, Türk-İngiliz İlişkileri.
8	Ara sınav
9	Türkiye Cumhuriyeti'nin 1931-1939 Dönemi: Montreux Boğazlar Sözleşmesi, Sadabat Paktı, Hatay sorunu.
10	Atatürk İlkeleri: Cumhuriyetçilik, Halkçılık, Milliyetçilik.
11	Atatürk ilkeleri: Devletçilik, Laiklik, İnkılapçılık.
12	İsmet İnönü Dönemi (1938-1950). İkinci Dünya Savaşı, İkinci Dünya Savaşı sonrasında iç politika.
13	Demokrat Parti Dönemi (1950-1960).
14	Türkiye Cumhuriyeti'nin 1960-1990 yılları arasındaki iç ve dış politikası.
15	Soğuk Savaş Dönemi ve sonrasında Türkiye.
16	Final Sınavı

v

ANKARA SCIENCE UNIVERSITY
COMMON COURSES DEPARTMENT

TUR 101 – Turkish I

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Introduction to Information Technologies	TUR 101	Fall	2	0	0	2	4
Prerequisites	None						
Course Language	Turkish						
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)	Lecturer Kudret Ceran						
Course objective	The Turkish Language course program enables the student to use his / her native language sufficiently and correctly, to be able to reflect on a subject thoroughly; to teach him how to convey what he thinks in a rational, simple, original, effective way in written and verbal; to gain the ability to benefit from various sources and to evaluate data; to give the habit of listening, criticizing, thinking in a planned way, respecting thoughts and speaking in front of the public; To comprehend the importance of listening and reading in being successful and gaining knowledge; It includes the aims of directing the student to be a good listener and reader.						

Course Content	What is language ?, Relationship with Other Areas Language What is it ?, Earth Languages and Types ,, Development of Turkish Language and Historical Period, Rise of Language Related Theories, the alphabet used in Turkish Spelling, Turkish Language Studies, Turkey phonetic features of Turkish, Audio Alignment, Parts Top Phonemes, Affixes of Turkish, Roots in Turkish, Word Making, Word Types, Phrases, Elements of Sentence, Sentence Types, Turkish Word Presence, Turkish Expression Power, Interaction Between Languages and Turkish, The Effect of World Languages on Turkish Language, Usage of Turkish, Word Presence, Teaching in a Foreign Language.
References	Aksan, Doğan; Language in Every Aspect, TDK Pub., Ankara, 1979. Ercilasun, Ahmet B .; Turkish Language History from the Beginning to the Twentieth Century, Akçağ Pub., Ankara, 2004. Ergin, Muharrem; Turkish Grammar, Flag Pub., Istanbul, 1998. Burning, Ali; Turkish Language and Composition Information for Universities, Yargı Pub., Ankara, 2017.
Learning Outcomes	Gains knowledge of the definition and functions of the language and the basic features of Turkish. Knows the relationship between language and thought. Gains knowledge of the place of Turkish language in the world. Gains the ability to express himself correctly and effectively. Creates scientific texts on subjects related to his field and understands and evaluates scientific texts related to his field. Gains writing skill. Explains and exemplifies the phonetic features, structural features and sentence features of Turkish. Will be able to understand and evaluate what he has read.

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Form IVb (English): Subjects by weeks

Weeks	Subjects
1. Week	Definition of Language, Features of Language, Language and Culture, Language and Communication, Language and Thought, Place of Turkish among World Languages, Classification of Languages: World languages in terms of origin, world languages in terms of structure.
2. Week	Development and Historical Periods of Turkish Language, Age of Turkish, Classification of Turkish Written Languages and Dialects, Theories Related to the Birth of Languages, Types of Language: dialect, accent, dialect, written language, spoken language ...
3. Week	The alphabet used in Turkish Spelling: Göktürk, Mani, Uighur alphabet ... Turkish Language Studies, Writing and Language Revolution, Ataturk and the Turkish language, phonetic features of Turkey Turkish, the Turkish Syllable Structure
4. Week	Vocal Harmony: big vowel harmony, little vowel harmony. Sound Phenomena: sound resemblance, sound change, sound derivation, sound drop, sound narrowing, collapse.
5. Week	Phonemes on Tracks: accent, intonation, pause. Basic Concepts of Morphology, Turkish Attachments: construction attachments, inflectional attachments
6. Week	Roots in Turkish, Word Making: analogy, derivation, karma, abbreviation… Types of Words: words in terms of meaning, words in terms of genre and task.

7. Week	Phrases: phrases, exclamation group, title group, number phrase, reduplications, compound verb phrase, noun-verb / adjective-verb / adverb-verb phrase, abbreviation phrases
8. Week	Midterm
9. Week	Elements of the sentence: predicate, subject, object, place clause, mark complement, non-sentence elements
10. Week	Types of Sentences: sentences according to their structure, sentences according to the type of the predicate, sentences according to the place of the predicate, sentences according to their meanings.
11. Week	The Word Presence of Turkish, The Expressive Power of Turkish. Differences Between Idioms, Proverbs, Idioms and Proverbs, Quotes, Dialect Items
12. Week	Interaction Between Languages and Turkish, Richness Areas of Languages, Historical Depth and Geographical Extent, Word Presence and Expression Power, Proverbs and Expressive Power, Diversity in Kinship Names, Relationship and Kindness Words.
13. Week	The Effect of World Languages on Turkish Language, The Effect of Foreign Languages in the Ancient Turkish Period, The Effect of Western Languages on Turkish.
14. Week	Usage of Turkish in Mass Media. Usage of Turkish in Social Media.
15. Week	Discourse Disorders, Vicious Words in Speech and Writing, Density of Foreign Words, Teaching in Foreign Language, Science Terms, Turkish in Business Life.
16. Week 17. Week	Final Exam

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Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	66	%0
Laboratory	0	%0
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	%40
Final Exam	1	%60
Total	0	%100
Contribution of semester Works to success points	0	%40
Contribution of final exam to success points	0	%60
Total	0	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)		2	
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			
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			
Total Workload/30 hours			
ECTS			

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

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

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

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ANKARA SCIENCE UNIVERSITY
COMMON COURSES DEPARTMENT

TUR 102 Turkish II

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS
Introduction to Information Technologies	TUR 102	Spring	2	0	0	2	4
Prerequisites	None						
Course Language	Turkish						
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)	Lecturer Kudret Ceran						
Course Objective	The Turkish Language course program enables the student to use his / her native language sufficiently and correctly, to be able to reflect on a subject thoroughly; to teach him how to convey what he thinks in a rational, simple, original, effective way in written and verbal; to gain the ability to benefit from various sources and to evaluate data; to give the habit of listening, criticizing, thinking in a planned way, respecting thoughts and speaking in front of the public; To comprehend the importance of listening and reading in being successful and gaining knowledge; It includes the aims of directing the student to be a good listener and reader. However; It is an active learning course that aims to develop students' critical thinking, creating and expressing skills.						

Course Content	Diction, communication, communication elements and types, factors preventing communication, basic concepts and terms related to speech. Physical elements that create sound and applied studies. Breathing training and breathing control, application exercises. Stress, intonation, tune at the crossroads. The mental, psychological, social and cultural elements and applied studies that create the sound. Features that should be present in the speaker. Other concepts related to speech. Using the body in speech, non-verbal communication. Look, eye contact, facial expression. Using the body in speaking, non-verbal communication and practical exercises. Using the body in speaking, non-verbal communication and practical exercises. Impression, persuasion. Correspondence Types, Thought Writings, Artistic Writings, Accessing Information, Library Use, Electronic Resources, Resource Discovery Tools, Scientific Research and Writing Techniques, Types of Speech and Oral Expression, Presentation Techniques.
References	Aksan, Doğan; Language in Every Aspect, TDK Pub., Ankara, 1979. Ercilasun, Ahmet B .; Turkish Language History from the Beginning to the Twentieth Century, Akçağ Pub., Ankara, 2004. Ergin, Muharrem; Turkish Grammar, Flag Pub., Istanbul, 1998. Burning, Ali; Turkish Language and Composition Information for Universities, Yargı Pub., Ankara, 2017.
Learning Outcomes	Knows the physical elements of speech. Knows the mental components of speech. Gains knowledge of emphasis, intonation, and speech disorders. Makes a prepared speech. Creates scientific texts on subjects related to his field and understands and evaluates scientific texts related to his field. Gains writing skill. Improves oral expression skills. Knows the concepts and concepts of reading, comprehension, listening.

Form IVb (English): Subjects by weeks

Weeks	Subjects
18. Week	Correspondence Types
19. Week	Thought Articles I
20. Week	Thought Writings II
21. Week	Artistic Writings I
22. Week	Artistic Writings II
23. Week	Accessing Information - Using the Library
24. Week	Access to Information - Electronic Resources
25. Week	Midterm
26. Week	Accessing Information - Resource Discovery Tools and Techniques
27. Week	Scientific Research and Writing Techniques-I
28. Week	Scientific Research and Writing Techniques-II
29. Week	Speech and Speech Types
30. Week	Presentation techniques
31. Week	Composition Information
32. Week	Paragraph and Paragraph Types of Expression

33. Week 34. Week	Final Exam

Form Vb (İngilizce): Assessment Method

Semester Works	Number	Contribution
Attendance	86	%0
Laboratory	0	%0
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	%40
Final Exam	1	%60
Total	0	%100
Contribution of semester Works to success points	0	%40
Contribution of final exam to success points	0	%60
Total	0	%100

Form VIb (English): WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)		2	
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			
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			
Total Workload/30 hours			
ECTS			

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

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

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

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ANKARA SCIENCE UNIVERSITY
COMMON COURSES DEPARTMENT

OHS 101 - Occupational Health and Safety I

Course Information

CourseName	Code	Period	Theoretical (hrs/week)	Application (hrs/week)	Laboratory (hrs/week)	NationalCredit	ECTS
Occupational Health and Safety I	OHS 101	Fall	1	0	0	1	1
Course Prerequisites	No						
Course Language	Turkish						
Course Type	Imperative						
Course Delivery Method (face-to-face, distance education)	Face-to-face						
Learning and teaching strategies	Lecture, discussion and presentation.						
Instructor	Lecturer. Asst. Afet GÜLLER						
Course Description	It is a course that aims to inform students about occupational accidents and occupational diseases, to make them understand how to take safety precautions and to gain the necessary occupational health and safety knowledge in order to apply these achievements in the workplace.						

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Course Outline	**Definition of occupational safety, Accident occurrence and types, Occupational Diseases and ways of protection, Ergonomics, Risk factors, Protectors in Occupational Safety, Occupational Safety and occupational health legislation and Occupational Safety Investigation It includes the basis of Employer Obligations and Employee Responsibilities.**
Course Attendance / Participation Status	**Students are required to attend 70% of the course.**
Resources	1. **Prof. Dr. Kenan Ören, Occupational Health and Safety, Nobel Publishing.** 2. **Downloadable lecture notes published from Teams**
Learning Outcomes	**After taking this course, students will be able to;** 1. **Will be able to comprehend the basic concepts and historical development of occupational health and safety.** 2. **Will be able to gain knowledge about occupational health and safety legislation in the workplace and will be able to master the practices in the workplace.** 3. **Will be able to comprehend the duties, powers and responsibilities of the occupational safety specialist in the workplace.** 4. **Will be able to analyze the issue of the legal responsibility of the employer.**

Topics by week

Weeks	**Topics**
1. Week	**Explaining the course introduction and application, evaluation information to the student, emphasizing the importance of the course in the curriculum and its interaction with other courses** 1. **Concepts and Rules of Occupational Health and Safety** 1.1. **Occupational Health and Safety Overview**
2. Week	**Safety Culture, Occupational Safety in Turkey and in the World**

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3. Week	**Occupational Diseases**
4. Week	**Risk Assessment**
5. Week	**Risk Factors - Physical**
6. Week	**Chemical Risk Factors**
7. Week	**Biological Risk Factors**
8. Week	***MIDTERM EXAM***
9. Week	**Psychological Risk Factors - Mobbing**
10. Week	**Ergonomics I**
11. Week	**Basic Law, Labor Law and Occupational Safety Law I**
12. Week	**Basic Law, Labor Law and Occupational Safety Law II**
13. Week	**Employer Obligations and Employee Responsibilities I**
14. Week	**Employer Obligations and Employee Responsibilities II**
15. Week	**Occupational Health and Safety in Laws, Regulations and Directives** **Related Institutions and Organizations**
16. Week	***FINAL WEEK***
17. Week	***FINAL WEEK***

Evaluation Method

SemesterStudies	**Number**	**Contribution**
Accession	**0**	**% 0**
Laboratory	**0**	**% 0**
Application	**0**	**% 0**
Fieldwork	**0**	**% 0**
Practical	**0**	**% 0**
Homework Assessment	**0**	**% 0**

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Quiz	**0**	**% 0**
Presentation	**0**	**% 0**
Project	**0**	**% 0**
Seminar	**0**	**% 0**
Midterm Exam	**1**	**% 40**
Final Exam	**1**	**% 60**
Sum	**2**	**% 100**
The Contribution of Term Studies to the Success Score	**1**	**% 40**
The Contribution of the Final Exam to the Success Score	**1**	**% 60**
Sum	**2**	**% 100**

Workload and ECTS Calculation

Activities	Number	Duration (hours)	Total workload
Duration of the Course	14	1	14
Laboratory			
Application			
Specifichands-ontraining			
Field Studies			
Extracurricular Study Hours (Pre-study, reinforcement, preparation for exams)	2	3	6
Presentation / Seminar Preparation			
Project			
Homework Assessment			
Quiz			
Midterm Exams (Study Time)	1	2	2
Final Exam (Study Time)	1	3	3
TotalWorkload			25
TotalWorkload/25 hours			1
ECTS			1

Program Learning Outcomes - Course Learning Outcomes Matrix

Program Learning Outcomes	Learning Outcomes			
	SO1	SO2	SO3	SO4
POW-1	1	1	1	1
PÖÇ-2	1	1	1	1
PEO-3	1	1	1	1
POC-4	1	1	1	1
LO-5	1	1	1	1
POC-6	1	1	1	1
LO-7	1	1	1	1
POC-8	1	1	1	1
POC-9	1	3	3	4
PLO-10	1	1	1	1
POC-11	1	1	1	1
PÖÇ-12	1	1	1	1
PÖÇ-13	3	1	1	1
PÖÇ-14	1	1	1	1
PLO-15	1	1	1	1
POC-16	1	1	1	1

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

ANKARA SCIENCE UNIVERSITY

COMMON COURSES DEPARTMENT

OHS 102 - Occupational Health and Safety II

Course Information

CourseNam e	Cod e	Perio d	Theoretica l (hrs/week)	Applicatio n (hrs/week)	Laborator y (hrs/week)	Nationa l Credit	ECT S
Occupational Health and Safety II	OHS 102	Spring	1	0	0	1	1
Course Prerequisites	No						
Course Language	English						
CourseType	Imperative						
Course Delivery Method (face-to-face, distance education)	Online						
Learning and teaching strategies	Lecture, discussion and presentation.						
Instructor	Yavuz Selim Özdemir						
Course Description	This course will provide an overview of occupational health and safety, national occupational health and safety system, occupational health and safety approach and legislation, occupational health and safety services to be fulfilled by the employer, individual and organizational factors, records to be kept in occupational health and safety. In this course, students will have knowledge about occupational health and safety issues of various types of work.						
Course Outline	Occurrence and types of accidents, Occupational safety in electrical and non-electrical appliances in the workshop, Protectors in Occupational Safety, First Aid rules, Safety measures in Fire and Explosions, Occupational Safety and Occupational Health Legislation and Occupational Safety Investigation.						
Course Attendance / Participation Status	Students are required to attend 70% of the course.						
Resources	1. Prof. Dr. Kenan Ören, Occupational Health and Safety, Nobel Publishing. 2.						

Learning Outcomes	After taking this course, students will be able to: 1. To provide students with basic knowledge, skills and understanding in this field, 2. Recognize occupational safety equipment and use it correctly, 3. These equipment include protective clothing, hearing protectors, eye protection and similar equipment, 4. The causes of the accident and the post-accident process, 5. First aid, 6. Health and Safety Signs, 7.Learns how the working environment should be.

Topics by week

Weeks	**Topics**
1. Week	Work Environment Surveillance
2. Week	OHS in Electrical Work I
3. Week	OHS II in Electrical Work
4. Week	Working in Confined Spaces
5. Week	Occupational Accidents, Accident Cause Theories
6. Week	Post-Accident Processes I
7. Week	Post-Accident Processes II
8. Week	***MIDTERM EXAM***
9. Week	Health and Safety Signs I
10. Week	Health and Safety Signs II
11. Week	Conservation Policies I
12. Week	Conservation Policies II
13. Week	Fire
14. Week	Fire
15. Week	First Aid
16. Week	***FİNAL HAFTASI***
17. Week	***FİNAL HAFTASI***

Evaluation Method

Term Studies	**Number**	**Contribution**
Accession	0	% 0
Laboratory	0	% 0
Application	0	% 0
Fieldwork	0	% 0
Pratik	0	% 0
Assignment Evaluation	0	% 0
Quiz	0	% 0
Presentation	0	% 0
Project	0	% 0
Seminar	0	% 0

Midterm Exam	1	% 40
Final Exam	1	% 60
Sum	2	% 100
The Contribution of Term Studies to the Success Score	1	% 40
The Contribution of the Final Exam to the Success Score	1	% 60
Sum	2	% 100

Workload and ECTS Calculation

Activities	**Number**	**Duration (hours)**	**Collected load**
Duration of the Course	14	1	14
Laboratory			
Application			
Specifichands-ontraining			
Field Studies			
Extracurricular Study Hours (Pre-study, reinforcement, preparation for exams)	2	3	6
Presentation / Seminar Preparation			
Project			
Homework Assessment			
Quiz			
Midterm Exams (Study Time)	1	2	2
Final Exam (Study Time)	1	3	3
TotalWorkload			**25**
TotalWorkload/25 hours			**1**
ACT			**1**

Program Learning Outcomes – Matrix of Course Learning Outcomes

Program Learning Outcomes	**Learning Outcomes**						
	ÖÇ1	ÖÇ2	ÖÇ3	ÖÇ4	ÖÇ5	ÖÇ6	ÖÇ6
POW-1	1	1	1	1	1	1	1
PÖÇ-2	1	1	1	1	1	1	1
PEO-3	1	1	1	1	1	1	1
POC-4	1	1	1	1	1	1	1
LO-5	1	1	1	1	1	1	1
POC-6	1	1	1	1	1	1	1
LO-7	1	1	1	1	1	1	1
POC-8	1	1	1	1	1	1	1
POC-9	1	1	1	1	1	1	1
PLO-10	1	1	1	1	1	1	1
POC-11	1	1	1	1	1	1	1

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