

BİLGİSAYAR MÜHENDİSLİĞİ BÖLÜMÜ

MÜFREDAT EL KİTABI



COMPUTER ENGINEERING DEPARTMENT

CURRICULUM HANDBOOK

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

Bilgisayar mühendislerinin çeşitli alanlardaki mesleki uygulamaları gerçekleştirebilmeleri için modern bilgisayar teknolojilerini iyi bilmesi, en iyi ve probleme en uygun veri yapılarını, ileri düzey algoritmaları seçerek doğru bir şekilde kullanabilmeleri gereklidir, bu zor problemleri çözen yazılım sistemlerini tasarlayıp en düşük maliyetle inşa etmeleri ancak böyle mümkün olacaktır. Bilgisayar Mühendisliği bölümünde verilmekte olan veri yapıları, algoritmalar, işletim sistemleri, veritabanları, bilgisayar grafikleri ve bilgisayar ağları gibi dersler ile mezunlarımızın bu konular ve benzer kritik alanlardan da sıçrama yapabilecekleri şekilde mesleki yeterliliği hedeflenmektedir. Bilgisayar Mühendisliği, Yazılım Mühendisliğine benzer şekilde yazılım geliştirme, denetleme ve doğrulama testlerinin yapılması ve bakımı için sistematik, disiplinli ve hesaplanabilir bir yaklaşım kullanarak standart mühendislik prensiplerini uygulamaya dikkat etmektedir.

VİZYON

Apple, Google, Microsoft ve Facebook firmalarının hepsi bilgisayar / yazılım şirketleridir ve dünyanın en değerli 5 markası arasındadır. Dünyanın en değerli şirketi olan Amazon ise, çevrim içi kitap satarak e-ticarete başlamıştır ve şimdi her kategoride çevrim içi alışveriş için bilgisayar sistemlerini ve yazılımlarını kullanmaktadır. Bu yazılım şirketlerinin her biri Mercedes-Benz, Toyota ve Volkswagen gibi en değerli otomobil üretim firmalarından 5 ila 10 kat daha değerlidir. Bilgisayar mühendisleri için bilgisayar oyunu geliştirme, e-ticaret uygulamaları, e-devlet uygulamaları, iş yazılımı geliştirme, veritabanı tasarımı ve yönetimi, bilgisayar sistemi ve ağ yönetimi olmak üzere birçok istihdam alanı bulunmaktadır. Bilgisayar mühendislerine gelecekte olacak ihtiyaç açıktır ve bu ihtiyaç bilgisayar elektroniği ve yazılımındaki ilerlemelerle artmaya devam edecektir.

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

In order for Computer engineers to accomplish applications of their profession in various fields, they need to know modern computer technologies well, select the best and most suitable data structures to the problem at hand, advanced level algorithms and correctly implement them. Main reason behind this is the fact that these difficult problems require software systems to be designed by them and they, in turn, should be constructed with the least cost possible. Lectures being given in the Computer Engineering department such as data structures, algorithms, operating systems, databases, computer graphics and computer networks will enable our graduates to propagate their proficiency further from these subjects and similar critical fields. Computer Engineering, similar to Software Engineering, strives to apply standard engineering principles using a systematical, disciplined and calculable approach for performing software development, control and verification tests and maintenance.

VISION

Apple, Google, Microsoft and Facebook are computer / software companies and they are among the 5 most valued brands in the world. The most valuable brand, Amazon, started in e-commerce by selling online books and nowadays, they are engaged in online shopping within every category of items using computer systems and software. Each one of these software companies is 5 to 10 times more valuable than the most valued car production companies like Mercedes-Benz, Toyota and Volkswagen. There exist many employment fields for Computer engineers such as video game development, e-commerce applications, e-devlet applications, business software development, database design and management, computer system and network management. The need for new Computer engineers in the future is clear and this need will keep on rising with the breakthroughs in computer electronics and software.

	I. YARIYIL				
Kod	Ders adı	Т	U	UK	AKTS
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	2	4	6
EEE 103	Molecular Biology ang Biochemistry	3	0	3	5
HIS 101	Principles of Ataturk and History of Revolutions I	2	0	2	2
TUR 101	Turkish I	2	0	2	2
	Open Course I	0	0	0	0
Semester Credits		20	4	22	30

	II. YARIYIL				
Kod	Ders adı	Т	U	UK	AKTS
CENG 102	Algorithms and Programming with Java	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	2	4	6
HIS 102	Principles of Ataturk and History of Revolutions II	2	0	2	2
TUR 102	Turkish II	2	0	2	2
	Non-Departmental Elective I	2	0	3	3
	Open Course II	0	0	0	0
Semester Credits		19	6	23	30

	III. YARIYIL				
Kod	Ders adı	Т	U	UK	AKTS
EEE 203	Digital Design	3	2	4	5
CENG 281	Electrical Circuits	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
Semester Credits		20	4	22	31

	IV. YARIYIL				
Kod	Ders adı	Т	U	UK	AKTS
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
CENG 236	Probability and Statistics for Engineers	3	0	3	5
SENG 244	Object Oriented Software Engineering	3	0	3	6
ENG 202	Academic English IV	2	0	2	2
Semester Credits		17	0	17	30

	V. YARIYIL				
Kod	Ders adı	Т	U	UK	AKTS
CENG 301	Operating Systems	3	0	3	6
CENG 351	Database Management Systems	3	0	3	6
SENG 211	Software Engineering	3	0	3	5
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
Semester Credits		17	0	17	29

	VI. YARIYIL				
Kod	Ders adı	Т	U	UK	AKTS
CENG 332	Computer Architecture	3 0			6
CENG 336	Computer Networks	mputer Networks 3 0			6
CENG 378	Computer Graphics	3	0	3	6
	Technical Elective II	3	0	3	5
CENG 384	Intro. to Signals Processing for Comp. Engineers	3	0	3	5
ENG 302	Academic English VI	2	0	2	2
Semester Credits		82	0	18	30

	VII. YARIYIL				
Kod	Ders adı	Т	U	ик	AKTS
CENG 491	Graduation Project I	3	2	4	5
	Technical Elective III	3	0	3	5
	Technical Elective IV	3	0	3	5
	Technical Elective V	3	0	3	5
	Technical Elective VI	3	0	3	5
	Non-Departmental Elective III	3	0	3	3
CCE 401	Critical Thinking, Creativity and Entrepreneurship	2	0	2	2
Semester Credits		20	2	21	30

	VIII. YARIYIL				
Kod	Ders adı	Т	U	UK	AKTS
CENG 492	Graduation Project II	3	2	4	5
CENG 410	Long Term Practice	0	16	8	25
Semester Credits		3	18	12	30
	TOPLAM KREDİ				

Tech elective (SEÇMELİ) DERSLER					
Kod	Ders adı	т	U	υκ	AKTS
CENGTE	Business Intelligence (Unit 14)	3	0	3	5
CENGTE	Machine Learning (Unit 26)	3	0	3	5
CENGTE	Artificial Intelligence (Unit 27)	3	0	3	5
SENG 311	Software Requirements Engineering				
SENG 324	Software Design Patterns				
SENG 322	Software Validation and Verification				
SENG 442	Software Project Management				

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

COURSE SYLLABUS ALGORITHMS AND PROGRAMMING WITH JAVA-I

COURSE INFORMATION

Course Name	Code	Semester	Theory	Application	Laboratory	National	ECTS
			(hours/week)	(hours/week)	(hours/week)	Credit	
Algorithms and Programming with Java-I	CENG 101	Fall	3	0	2	4	6
Prerequisites	None						
Course Language	English						
Course Type	Compuls	sory					
Mode of Delivery (face to face, distance learning) Learning and			Learning/Hybri				
teaching strategies							
Instructor (s)	Asst. Pro	of. Yüksel A	rslan,				
Course objective	 To understand the use of predefined classes and objects. To understand fundamentals of a computer and programming topics, To develop basic computational thinking skills, i.e., algorithmic thinking To get familiar with fundamental concepts and terminology in computer programming To be able to use an integrated development environment to design and write code in the Java programming language. To define and correctly use data types, decision structures, arrays, conditionals and loops. To understand the use of predefined classes and objects. 					write	

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

SUBJECTS BY WEEKS

Weeks	Subjects
1. Week	Fundamental concepts of Computer science
2. Week	Basics of Computer Architecture
3. Week	Computer Programs, Java Programming Language
4. Week	Software errors, Problem Solving, Fundamentals of Algorithm Design
5. Week	Fundamental Data Types
6. Week	Input and Output, Display the results, Problem solving, Java String type
7. Week	Decision using if Statement, Comparing Numbers and Strings, Multiple Alternatives
8. Week	Midterm Exam
9. Week	Nested Branches, Problem Solving
10. Week	Loops, Implement while, for and do loops
11. Week	Read and Process data set, Problem Solving: Storyboards, Common Loop algorithms, Nested Loops, their applications
12. Week	Methods, Implementing Methods
13. Week	Decomposing complex tasks into simpler ones
14. Week	Arrays & Array List, Arrays, Enhanced For Loop
15. Week	Two Dimensional Arrays, Array & Array Lists
16. Week	Final Exam

ASSESSMENT METHOD

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	12	%30
Application	0	%0
Fieldwork	0	%0
Practice	0	%0

Homework Assessment	0	%0
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	26	%100
Contribution of semester Works to success points	13	%60
Contribution of final exam to success points	1	%40
Total	14	%100

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory	12	2	24
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	6	84
Presentation / Seminar Preparation			
Project			
Homework assignment			
Midterms (Study duration)	1	15	15
Final Exam (Study duration)	1	20	20
Total Workload		•	185
Total Workload/30 hours			6.17
ECTS			6.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes		Contri	bution	Level*	:
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.				X	
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.				X	
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.				X	
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X			
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.			X		

Information about the effects of engineering applications on health,		X	
environment and safety in universal and social dimensions and the			
problems reflected in the engineering field of the age; awareness of			
the legal consequences of engineering solutions.			

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

ANKARA SCIENCE UNIVERSITYFACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

COURSE SYLLABUS 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	English								
Course Type	Compulse	ory								
Mode of Delivery	Face to fa	ace								
Learning and Teaching strategies	Lecturing	g, discussion	, and submission	n						
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			letric Version), hth Edition, by C							
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.						riable, etric			

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	Quiz-1
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	Quiz-2
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	Quiz-3
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	HW
15.week	Average Value of a Function Arc length Area of a Surface of Revolution	Quiz-4
16.week	Final Exam	

Assessment Method

Semester Works	Number	Contribution
Attendance	14	0%
Laboratory	0	0%
Application	0	0%
Fieldwork	0	0%
Practice	13	0%
Homework Assessment	1	0%
Quiz	4	20%
Presentation	0	0%
Project	0	0%
Seminar	0	0%
Mid-term Exam(s)	1	30%
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%

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	8	8			
Quiz	0	0	0			
Midterms (Study duration)	1	14	14			
Final Exam (Study duration)	1	18	18			
Total Workload	180					
Total Workload/30 hours	6					
ECTS	6					

Program Learning Outcomes - Course Learning Outcomes Matrix

Program Outcomes	Course Learning Outcomes				
S	LO1	LO2	LO3	LO4	LO5
1 Qualified knowledge of mathematics, science, and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.	5			5	
2 An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.		5			
3 An ability to design a complex system, process, device, or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.					
4 Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.					5
5 Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or disciplinespecific research topics.			5		

6 Ability to work effectively in			
disciplinary and multidisciplinary teams;			
self-study skills.			
7 Ability to communicate effectively in			
verbal and written Turkish; knowledge of			
at least one foreign language; ability to			
write effective reports and understand			
written reports, to prepare design and			
production reports, to make effective			
presentations, to give clear and			
understandable instructions and			
receiving skills.			
8 Awareness of the necessity of lifelong			
learning; the ability to access			
information, follow developments in			
science and technology, and constantly			
renew oneself.			
9 To act in accordance with the ethical			
principles, professional and ethical			
responsibility awareness; information			
about standards used in engineering			
applications.			
10 Information on business practices			
such as project management, risk			
management and change management;			
awareness about entrepreneurship and			
innovation; information on sustainable			
development.			
11 Information about the effects of			
engineering applications on health,			
environment and safety in universal and			
social dimensions and the problems			
reflected in the engineering field of the			
age; awareness of the legal			
consequences of engineering solutions.			

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING AND ARCHITECTURE PHY 101 SYLLABUS

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS		
Probability		Fall	3	0	0	3	5		
Theory									
Prerequisites									
Course Language	English								
Course Type	Compulso	ry							
Mode of	Face to fac	ce							
Learning and	Lecturing,	discussion an	d submission.						
teaching strategies									
Instructor (s)	Dr. Neslih	Dr. Neslihan GÖKÇEK, Dr. Vedat TANRIVERDİ							
Course objective	Upon the	successful c	ompletion of this	course, students	will establish the	e relationship	between		
		and engineer g problems.	ing. This includes	to provide student	s the concepts of n	nechanics with	n defining		
Course Content	Basic info	rmation about	the concepts of nat	ture of matter, mecl	hanics, kinetics and	l dynamics			
References	1. R. A. Se	erway & J. W.	Jewett, Physics for	r Scientists and Eng	gineers (6th Ed.), B	rooks Cole (2	007).		
	2. H. D. Y	oung and R. A	. Freedman, Unive	ersity Physics 12th-	14th Ed. Pearson (2	2008, 2016).			
	Principl	les of Physics	by Halliday, Resnic	ck, and Walker (10	th Edition), John W	iley (2014)			
Learning	1. Learn th	ne basic conce	pts of mechanics, k	inetics and dynami	ics				
outcomes	2. Apply t	he topics of m	echanics to their ov	wn engineering scie	ence				
	3. Improve	e the ability of	student's solution	perspective for diff	erent kinds of new	problems			
	4. Modelling a new problem related with the concepts of mechanics and interpret the results								
	5. The abi	lity to analyze	a problem graphic	ally					

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

I. Assignments & Quizzes:

II. Midterm Exam (closed book) : 40% III. Final Exam: (closed book) : 50%

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,	18	5	90
reinforcement, preparation for the exams)			
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): THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Course Outcomes							
	1	2	3	4	5			
1	5	5	5	5	5			
2		2	5	5				
3			5	5				
4				4	4			
5		2		5				
6								
7								
8								
9								
10								
11								

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

COURSE INFORMATION

Course Name	Code	Semeste r	Theory (hours/wee k)	Application (hours/wee k)	Laboratory (hours/wee k)	Nation al Credit	ECTS	
Algorithms and Programming with Java-II	CENG 102	Spring	3	0	4	5	8	
Prerequisites	Algorith	ms and Pro	ogramming wit	th Java-I				
Course Language	English							
Course Type	Compul	sory						
Mode of Delivery (face to face, distance learning)	Lecture	Lecture (if needed on line teaching)						
Learning and teaching strategies	Lecturin	g, discussi	on and submis	sion.				
Instructor (s)	Dr.Cevd	let Dengi, I	Dr.Sarper Alka	n				
Course objective	 To continue learning the Java language and understand more advanced features and semantics of the Java programming Proficient programming in the Java language and analyze, design, development, and debugging techniques appropriate for the Java To understand the concepts of classes, objects, and encapsulation To apply object-oriented design techniques for building complex programs in a systematic manner. To become familiar with common user-interface components and apply them to real world problems To understand several sorting and searching algorithms, and estimate 							

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

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

Subjects by weeks

Weeks	Subjects
1. Week	Ch.8 Objects and Classes
	To understand the concepts of classes, objects, and encapsulation. The public interface of a class, implementing instance method, constructors. To be able to design, implement and test your own classes. Static variables and static methods.
2. Week	Ch.8 Objects and Classes
	Week 1 topics continue
3. Week	Ch.9 Inheritance & Interface
	Inheritance and inheritance hierarchies, implementation of subclasses that inherit and override superclass methods, the concept of polymorphism. Common superclass Object and its methods and working with interface types
4. Week	Ch.9 Inheritance & Interface
	Week 3 topics continue
5. Week	Ch.12 Object Oriented Design
	Inheritance, aggregation, and dependency relationships between classes using UML class diagrams. Object oriented design techniques to building complex programs. Package usage to organize programs
6. Week	Ch.10 Graphical User Interfaces
	Implementation of basic graphical user interfaces, buttons, text fields, and other components to a frame window, handle events that are generated by buttons. Programming that display simple drawings.
7. Week	Ch.11 Advanced User Interfaces
	Layout managers to arrange user-interface components in a container. Common user-interface components, such as radio buttons, check boxes, and menus. events handling generated by user-interface components. Effective Java documentation.

8. Week	Midterm Exam
9. Week	Ch.7 Input/output and Exception Handling
	Read and Write text files, text input and output. Process command line arguments. Exception handling, throwing and catching exceptions, some examples and programming tips. Implementation programs that propagate checked exceptions and handling input errors.
10. Week	Ch.7 Input/Output and Exception Handling
	Week 9 topics continue
11. Week	Ch.13 Recursion
	The relationship between recursion and iteration, Use recursive helper methods. When the use of recursion affects the efficiency of an algorithm, efficiency of algorithm. Analyze problems much easier to solve by recursion. Recursive structures using mutual recursion
12. Week	Ch.14 Sorting & Searching
	Several sorting and searching algorithms and their performance evaluations. Analyzing the performance of the selection sort algorithm, analyzing the merge sort algorithm. To estimate and compare the performance of algorithms. Estimating the running time of an algorithm. Sorting and Searching in the Java Library
13. Week	Ch.14 Sorting & Searching
	Week 12 topics continue
14. Week	Ch.15 The Java Collections Framework
	Overview of the collection framework and the collection classes supplied in the Java library. Linked lists, sets, maps implementation. To choose appropriate collections for solving programming problems. To study applications of stacks and queues
15. Week	Ch.15 The Java Collections Framework
	Week 14 topics continue
16. Week	Final Exam

Assessment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	14	%35
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	0	%0
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	30	%100
Contribution of semester Works to success points	15	%60
Contribution of final exam to success points	1	%40
Total	16	%100

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory	14	4	56
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	6	84
Presentation / Seminar Preparation			
Project			
Homework assignment	7	4	28
Midterms (Study duration)	1	15	15
Final Exam (Study duration)	1	20	20
Total Workload		1	245
Total Workload/30 hours			8.17
ECTS			8.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*					
	1	2	3	4	5	
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X		
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X	

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

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING AND ARCHITECTURE ALL ENGINEERING DEPARTMENTS

Course Information

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS		
Calculus II	MATH 102	Fall	4	0	0	4	6		
Prerequisites	Math 101								
Course Language	English								
Course Type	Compulsory								
Mode of Delivery	Face to face								
Learning and Teaching strategies Instructor(s)	Lecturing, discussion, and submission Dr. Berrin Şentürk, Dr. Neslihan Ayşen Özbay								
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	 Calculus (Metric Version), 8th (or 7th) Edition, by James Stewart Calculus, 14th Edition, by George B. Thomas (Supplementary Book) Calculus, Multivariable 2nd Edition by Brian E. Blank, Steven G. Krantz 								
Learning Outcomes	Upon successful completion of this course, a student will be able to: 1. Test series for convergence and divergence, represent elementary and transcendental functions of one variable as Taylor or Maclaurin series 2. Perform vector operations such as vector addition, scalar multiplication, dot product and cross product 3. Relate vector operations to geometric notions and structures such as distance, projection, orthogonality, parallelism, lines, and planes in R^3 4. Solve maximum and minimum problems and apply the method of Lagrange multipliers for multivariable functions 5. Evaluate limits, partial derivatives, directional derivatives, multiple integrals of multivariable functions 6. Compute limits, derivative and integrals of vector functions. 7. Expose to the concept of three-dimensional analytical geometry.								

Subjects by weeks

Weeks	Subjects
1. week	11.1 Sequences 11.2 Series 11.3 The integral test, the Limit of a Function,

	11.4 The comparison tests
2. week	11.5 Alternating series
2 1	11.6 Absolute Convergence, the Ratio and Root Tests
3.week	11.8 Power Series
	11.9 Representation of Functions as Power Series
4.week	11.10 Taylor and Maclaurin Series
	12.1 3D Coordinate Systems
5.week	12.2 Vectors 12.3 The Dot Product
	12.4 The Cross Product
	12.5 Equations of Lines and Planes
6.week	12.6 Cylinders and Quadric Surfaces
	13.1 Vector functions and space curves
7.week	13.2 Derivatives and integrals of vector functions 13.3 Arc Length
	15.5 Are Length
8.week	Midterm Exam
	13.4 Velocity and Acceleration
9.week	14.1 Functions of Several Variables
10	14.2 Limits and Continuity
10.week	14.3 Partial Derivatives
11.week	14.4 Tangent Planes and Linear Approximations 14.5 The chain rule
11.week	14.5 The chain rule 14.6 Directional Derivatives and the Gradient Vector
	14.7 Maximum and Minimum Values
12.week	14.8 Lagrange Multipliers
10 1	15.1 Double integrals over rectangles 15.2 Double integrals over general regions
13.week	15.3 Double integrals in polar coordinates
	15.6 Triple integrals
14.week	15.7 Triple integrals in cylindrical coordinates
	15.8 Triple integrals in spherical coordinates
15.week	15.9 Change of variable in multiple integrals
16.week	Final Exam

Assessment Method

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		

Program Learning Outcomes - Course Learning Outcomes Matrix

Program Outcomes	Course Learning Outcomes				
	LO1	LO2	LO3	LO4	LO5
1 Qualified knowledge of mathematics, science, and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex	5			5	
engineering problems.					
2 An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.		5			
3 An ability to design a complex system, process, device, or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design					
methods for this purpose.					

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

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING AND ARCHITECTURE PHY 102 SYLLABUS

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECTS	
Probability Theory		Spring	3	0	0	3	5	
Prerequisites								
Course Language	English							
Course Type	Compulso	ry						
Mode of	Face to fac	ce						
Learning and teaching strategies	Lecturing,	Lecturing, discussion and submission.						
Instructor (s)	Dr. Neslih	Dr. Neslihan GÖKÇEK, Dr. Vedat TANRIVERDİ						
Course objective	electricity	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 cond	Basic concepts of electricity and magnetism such as circuits, Gauss's Law, Faraday's Law						
References	 R. A. Serway & J. W. Jewett, Physics for Scientists and Engineers (6th Ed.), Brooks Cole (2007). H. D. Young and R. A. Freedman, University Physics 12th-14th Ed. Pearson (2008, 2016). Principles of Physics by Halliday, Resnick, and Walker (10th Edition), John Wiley (2014) 							
Learning		Learn the basic concepts of electricity and magnetism						
outcomes	 Apply the topics of electromagnetism to their own engineering science Improve the ability of student's solution perspective for different kinds of new problems Modelling a new problem related with the concepts of electromagnetism and interpret the results 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

I.

Assignments & Quizzes: 10% Midterm Exam (closed book) : II. 40% 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,	18	5	90
reinforcement, preparation for the exams)			
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

Program Outcomes	Course Outcomes				
	1	2	3	4	5
1	5	5	5	5	5
2		2	5	5	
3			5	5	
4				4	
5		2		5	
6					
7					
8					
9					
10					
11					

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

Course Information

Course Name	Code	Semester	Theory (hours/we ek)	Application (hours/week)	Laboratory (hours/wee k)	National Credit	ECT S
Data Structures and Algorithms	CENG 213	Fall	3	0	0	3	5
Prerequisites	CENG 1	02 – Comput	er Programm	ning Java II	I	1	
Course Language	English						
Course Type	Compuls	sory					
Mode of Delivery (face to face, distance learning)	Face to f	Face to face/Distance Learning/Hybrid					
Learning and teaching strategies	Lecturing, discussion and submission.						
Instructor (s)	Dr. Ende	Dr. Ender Sevinç					
Course objective	To introduce you to data structures, an issue central to the art of computer programming.						
Course Content	The course covers algorithm analysis, selection/insertion/bubble sort quicksort and merge-sort algorithms, linear data structures, stacks, queues, linked lists, trees, priority queues, heaps, hash tables, graphs. Other content of this course is to teach students 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 for experienced programmers to use in building substantial information systems						

References	 i. Paul Deitel & Harvey Deitel, "C++: How to program / P.J. Deitel, H.M. Deitel, 8th Ed., 2016, Pearson ii. 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; 1. Examine the loop structures of either a recursive non-recursive algorithms and infer its asymptotic running time and express its efficiency using big-Oh notation 2. Assess the relative advantages of using array linked list implementations in efficiently solving search problems with concurrent insertion, and/or deletions on collections of data, design 3. Implement efficient computer programs running at the cost of O (log n) per searching, insertion and/or deletion of data items by employing correct variants of tree data structures covered in the course. 4. Develop efficient applications that require an order on data items by appropriately selecting the right sorting algorithm. 5. Describe the usage of various data structures. 6. Explain the operations for maintaining common data structures.

Course Schedule

Week	Topic
1	Introduction to C++ Programming
2	Introduction to Classes, Objects and Strings
3	Control Statements
4	Functions
5	Recursion
6	Arrays and Vectors
7	Pointers
	Midterm
8	Link-Based Implementations
9	Stacks
10	List & List Implementations
11	Sorting (selection, bubble, insertion)
12	Sorting (merge sort, quicksort, radix)
13	Queues & Priority Queues

14	Algorithm Efficiency
	Final

WORKLOAD AND ECTS CALCULATION

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

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*					
	1	2	3	4	5	
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X		
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X	
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.				X		
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X		
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.				X		
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X				
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.				X		
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X				
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X				
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.			X			

Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.		X	

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

Course Information

Course Name	Code	Semester	Theory (hours/week)	Applicatio n (hours/wee k)	Laboratory (hours/week	Nationa 1 Credit	ECT S	
Data Structures and Algorithms II	CENG 214	Spring	3	0	0	3	5	
Prerequisites	CENG 2	13 –Data Str	ructures and Alg	orithms				
Course Language	English							
Course Type	Compuls	Compulsory						
Mode of Delivery (face to face, distance learning)	Face to face/Distance Learning/Hybrid							
Learning and teaching strategies	Lecturing	Lecturing, discussion and submission.						
Instructor (s)	Dr. Ende	r Sevinç						
Course objective	Implement and analyze elementary data structures including trees, tries, tables, and graphs. Explore different searching, maintenance, sorting and traversal algorithms using these data structures.							
Course Content	Trees, search trees, balanced search trees: AVL, B-Tree, red-black trees, tries, Huffman compression coding, hash tables, graphs and graph traversal algorithms, Dijkstra shortest path, PRIM's spanning tree algorithm							
References	i. Frank M. Carrano and Timothy Henry, "Data Abstraction & Problem Solving with C++", 7th Ed., 2016, Pearson.						ing	

	ii. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, "Introduction To Algorithms", The MIT Press; 3rd edition
Learning	After taking this course students will be able to;
outcomes	1. Describe, explain, and use abstract data types including trees, tries, tables, and graphs
	2. Explore the use of in-memory and external memory data structures
	3. Implement a variety of algorithms such as searching, sorting, and traversal
	4. Implement abstract data types using both contiguous and linked representations
	5. Apply graph-based solutions to complex problems.

Course Schedule

Week	Topics (tentative)
1	Trees
2	Tree Implementations
3	Binary Tree, Binary Search Trees
4	Heaps,
5	Priority Queue
6	Dictionaries (Hashing)
7	Balanced Search Trees
	Midterm
8	Balanced Search Trees (2-3, 2-3-4 Trees)
9	Balanced Search Trees (Red-Black, AVL)
10	Graphs
11	Graphs
12	Applications of Graphs
13	Applications of Graphs
14	Processing data in external storage(B Tree)

14	Design of Algorithms (Dynamic Prog.)
	Final

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		L	144
Total Workload/30 hours			4.88
ECTS			5.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes		Contri	bution	Level*	
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical				X	

			<u> </u>
			X
		X	
		X	
		X	
X			
		X	
X			
X			
	X		
		X	
		X	X

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

COURSE INFORMATION

Course Name	Code	Semeste	Theory	Application	Laboratory	Nationa 1	EC TS
		1	(hours/week	(hours/week	(hours/week	-	15
)))	Credit	
Discrete	CENG	Fall	3	0	0	3	5
Mathematics	223						
Prerequisites	None						
Course	English						
Language							
Course Type	Compuls	sory					
Mode of	Face to f	ace/Distance	ce Learning/Hy	brid			
Delivery (face							
to face,							
distance							
learning)							
Learning and	Lecturin	g, discussio	on and submiss	ion.			
teaching							
strategies							
Instructor (s)	Mert ÖZ	ARAR, Ph	D				
Course	To teach	the basics	of discrete mai	thematical stru	ctures		
objective			-				
Course Content	• F	Proposition	al Logic				
		redicate Lo	•				
	• S	ets and Fu	nctions				
	• I	ntegers 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. know discrete maths 2. know basic concepts of data structures 3. understand the building blocks of computer science

Subjects by weeks

Weeks	Subjects
1. Week	Propositional Logic: Logic, Equivalences
2. Week	Predicate Logic: Predicates and Quantifiers, Nested Quantifiers
3. Week	Methods of Proof, Natural Deduction (additional material)
4. Week	Sets and Functions: Sets, Set Operations, Functions
5. Week	Growth of Functions, Complexity of Algorithms
6. Week	Integers: Integers and Division, Integers and Algorithms
7. Week	Midterm exam

8. Week	Applications of Number Theory (plus Basics of Cryptography)
9. Week	Induction and Recursion: Sequences and Summations, Mathematical Induction
10. Week	Recursive Definitions and Structural Induction, Recursive Algorithms
11. Week	Counting: Permutations and Combinations, Recurrence Relations
12. Week	Solving Recurrence Relations, Generating Functions, Inclusion and Exclusion
13. Week	Graphs: Int to Graphs, Terminology, Representing Graphs, Connectivity
14. Week	Euler and Hamiltonian Paths, Shortest Path Problem, Coloring
15. Week	Trees: Int. to Trees, Applications of Trees, Spanning Trees, Minimum Spanning Trees
16. Week	Final Exam

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	0	%0

Project	0	%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

WORKLOAD AND ECTS CALCULATION

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

Total Workload/30 hours	4.88
ECTS	5.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.				X	
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.				X	
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.				X	
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X			
Information on business practices such as project management, risk management and change management; awareness about			X		

entrepreneurship and innovation; information on sustainable development.			
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.		X	

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING AND ARCHITECTURE

COMPUTER, INFORMATION SYSTEMS, SOFTWARE, AND ELECTRICALELECTRONICS ENGINEERING DEPARTMENTS

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 10	Math 101							
Course Language	English	English							
Course Type	Compuls	sory							
Mode of Delivery	Face to f	face							
Learning and Teaching strategies	Lecturin	g, discussio	n, and submissi	on.					
Instructor	Dr. Sehe	er Fişekci Pa	ar						
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	 Elementary Linear Algebra with Applications, Bernard Kolman and David R. Hill, 2014, 9th ed., new int. ed., Pearson Advanced Engineering Mathematics, Cengage Learning, Peter V. O'Neil Differential Equations and Linear Algebra, C.H. Edwards & D.E. Penney, 2010, 4th Edition, Prentice Hall 4. Elementary Differential Equations and Boundary Value Problems, 2013, 								
Learning Outcomes	 Tenth Edition, William E. Boyce & Richard C. DiPrima, Wiley Upon successful completion of this course, a student will be able to: Express basic skills of ordinary differential equations and how such equations are used in engineering and science. Demonstrate ability to think critically by determining and using appropriate techniques for solving a variety of differential equations. Solve systems of linear equations; know the properties of matrices, compute, and use determinants to solve system of linear equations. Analyze vectors in Euclidean spaces geometrically and algebraically, discuss the concepts of span, linear independence, basis, dimension, and apply these concepts to various vector spaces. Determine and use orthogonality to find a basis for the null space of a matrix. 								

5. Compute eigenvectors and eigenvalues of a matrix and apply them to some diagonalization processes.

Subjects by weeks

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

Assessment Method

Semester Works	Number	Contribution
Attendance	14	0%
Laboratory	0	0%
Application	0	0%
Fieldwork	0	0%
Practice	14	0%
Homework Assessment	0	0%
Quiz	4	20%
Presentation	0	0%
Project	0	0%
Seminar	0	0%
Mid-term Exam(s)	1	30%
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	14	5	70
work, reinforcement, preparation for the			
exams)			
Presentation / Seminar Preparation	0	0	0
Project	0	0	0
Homework assignment	0	0	0
Quiz	0	0	0
Midterms (Study duration)	1	15	15
Final Exam (Study duration)	1	23	23
Total Workload		150	
Total Workload/30 hours	5		
ECTS			

Program Learning Outcomes - Course Learning Outcomes Matrix

Program Learning	Course Learning Outcomes				
Outcomes	LO1	LO2	LO3	LO4	LO5
1 Qualified knowledge of mathematics, science, and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.	5			5	
2 An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.		5			
3 An ability to design a complex system, process, device, or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.					
4 Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.					5
5 Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or disciplinespecific research topics.			5		
6 Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.					
7 Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills. 8 Awareness of the necessity of lifelong learning; the ability to access					
information, follow developments in science and technology, and constantly renew oneself.					

9 To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.			
10 Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.			
11 Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.			

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

COURSE INFORMATION

Course Name	Code	Semeste r	Theory (hours/week)	Application (hours/week	Laboratory (hours/week)	Nationa 1 Credit	EC TS	
Digital Design	EEE 203	Fall	3	0	2	4	5	
Prerequisites	None							
Course Language	English							
Course Type	Compuls	sory						
Mode of Delivery	Face to f	ace/Distan	ce Education					
Learning and teaching strategies	Lectures, Experiments, Problem Solving.							
Instructor (s)	Hakan Ç	ağlar, Asso	oc.Prof					
Course objective	_		-	e running princ ysis and desigr	-			
Course Content	Boolean analysis memory	functions, and design elements,	combinationa of sequential	ean algebra an l circuits, desi circuits, flip-1e logic device actions	gn of combin flops, counters	ational cir , shift regi	cuits,	
References	>= 50 0 Digit	th Edition,	2012 Pearson. Principles and	Ciletti, Digital l Practices, Auth	_			

	 Digital Design and Computer Architecture, D. Harris, S. Harris (Author), Morgan Kaufmann
Learning outcomes	 After taking this course, students will be able to; Able to analyze and design combinational circuits and optimize the design using tools such as Boolean algebra, Karnaugh map Use arithmetic circuits using half adders, subtractors and full adders, subtractors in design solutions Understand running principles synchronous sequential circuits with flipflops, shift registers and counters, Recognize ALU fundamentals and operations

Subjects by weeks

Weeks	Subjects
1	Number systems, conversion between binary, decimal, octal, hexadecimal systems, negative number representations
2	Boolean algebra, Boolean functions, logic gates, propagation delay, hazards, glitches
3	Canonical and standard forms Lab. Experiment: Construction of simple combinational circuits
4	Minimization of Boolean functions, 3 and 4 variable Karnaugh map method, NAND and NOR implementations, don't care conditions
5	Minimization of Boolean functions, 3 and 4 variable Karnaugh map method, NAND and NOR implementations, don't care conditions
6	Binary adder, subtractor, decimal adder, ripple adder
7	Definition of encoders and decoders, cascading decoders, definition of multiplexers and demultiplexers, expanding multiplexers. Combinational Programmable Logic Devices (PAL, PLA, GAL) Lab. Experiment: 4-bit ripple adder, usage of oscilloscope with logic channels, delay measurements
8	Definition of D-latch, D-flip-flop, JK-flip-flop, T-flip-flop, master-slave configuration. Asynchronous preset and clear inputs. Analysis of synchronous sequential circuits with D-flip-flops. Finding characteristic tables, state tables and state diagrams
9	Definition of D-latch, D-flip-flop, JK-flip-flop, T-flip-flop, master-slave configuration. Asynchronous preset and clear inputs. Analysis of synchronous sequential circuits with D-

	flip-flops. Finding characteristic tables, state tables and state diagrams
10	Design of synchronous sequential circuits with D-flip-flops
11	Finite state machines and design examples
12	Ripple counter and its disadvantages, synchronous serial and parallel counters, MSI counters, shift registers. Lab. Experiment: Flip-flops and MSI counter circuits
13	Introduction to memory devices: ROM, RAM, CPLDs and FPGAs
14	Introduction to ALU operations and microinstructions
15	Review of topics and contemporary implementations
16	Review of topics and contemporary implementations

Assessment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	12	%20
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Quizzes	4	%10
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	33	%100
Contribution of semester Works to success	32	%60

points		
Contribution of final exam to success points	1	%40
Total	33	%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	4	4	16
Midterms (Study duration)	1	10	10
Final Exam (Study duration)	1	20	20
Total Workload		1	131
Total Workload/30 hours			4.66
ECTS			5.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*

	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.					X
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.					X
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.		X			
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.	X				
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.	X				
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X			
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.	X				
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.	X				
L					

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

COURSE INFORMATION

Course Name	Code	Semeste	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	Nationa 1 Credit	ECT S	
Probability and Statistics for Engineers	CENG 236	Fall	3	0	0	3	5	
Prerequisites	None							
Course Language	English							
Course Type	Compuls	sory						
Mode of Delivery (face to face, distance learning)	Face to face/Distance Learning/Hybrid							
Learning and teaching strategies	Lecturin	g, discussio	on and submiss	ion.				
Instructor (s)	Hakan Ç	ağlar, Asso	oc. Prof.					
Course objective	industria one of the general controduced calculation total pro-	I and agricult important conceptions and the concording related bability for mensional ra	ultural product t basic courses and methods a ept of random The concept a mula and Baye andom variable	for engineering about probabilitievents, the related the properties' Rule. The cost. The concepts	line which are d technologies. g students that ty and statistics ationship between the state of condition oncept of independent and properties of function (pdf).	This cour shall knowns. It is also ten events all probabile endent events of probabiles of probabiles.	se is v the and lity.	

	distributions, random variable independency, the distribution of functions with respect to random variables. Expectation and variance of Binomial distribution, Poisson distribution, Uniform distribution, Exponential distribution and Normal distribution. The definition, properties and calculations of covariance and correlation coefficient. We stress theory and practice combined, in order to help students promote their ability of applying statistical methods in their daily life and scientific research.				
C					
Course Content	 Define the principal concepts about probability, its features. Solve the problems about permutation, combination and Binomial Theorem. Calculate probabilities using Conditional probability, Rule of total probability and Bayes' theorem. 				
	 Explain the concept of a random variable and the probability distributions. Define the concept of a random variable, express the features of discrete and continuous random variables. 				
	o Formulate the distribution functions.				
	o Calculate the expected value, variance and the moments.				
	 Explain major distributions of random variables. 				
	 Define the discrete distributions and solve the problems about these distributions. 				
	 Define the continuous distributions and solve the problems about these distributions. 				
References	Probability, Random Variables, and Stochastic Process 4th Edition A. Papulis, S.U.Pillai				
	ISBN-13: 978-0071226615				
Learning	After taking this course students will be able to;				
outcomes	 Understand the basic knowledge on fundamental probability concepts, including random variable, probability of an event, additive rules and conditional probability 				
	 Understand the concept of Bayes' theorem, the basic statistical concepts and measures 				
	 Understand several well-known distributions, including Binomial, Geometrical, Negative Binomial, Pascal, Normal and Exponential Distribution 				
	 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, some definitions, relative frequency definition, classical definition of probability theory, basic for statistics
2. Week	Probability and Induction, Causality Versus Randomness. Historical perspective, gambling and games of chance.
3. Week	The Axioms of Probability, Set Theory, set operations, mutually exclusive sets, De Morgan's Law, duality principle. Probability space, Equality of events.
4. Week	Axiomatic definition of events, Probability masses. Conditional Probability, Total probability and Bayes' theorem, Independence
5. Week	Repeated Trials, Combined Experiments, Cartesian product of two experiments, Independent experiments.
6. Week	Bernoulli Trials, Fundamental theorem, Most likely number of successes, Bernoulli's Theorem and Games of Chance, related problems.
7. Week	The Concept of a Random Variable. Introduction, Random variable, Events generated by Random variables, Probability Distribution and Probability Density Functions, Properties of Distribution functions.
8. Week	Midterm Exam
9. Week	Continuous, Discrete and Mixed type RV, Specific Random Variables, Existence theorem, Continuous type Random variables, Normal (Gaussian) Distribution, Exponential Distribution, Chi-Square Distribution, Rayleigh Distribution, Uniform Distribution, Beta Distribution, Laplace Distribution.
10. Week	Discrete type Random Variables, Bernoulli Distribution, Poisson Distribution, Binomial Distribution. Conditional Distributions. Extensions to Total Probability and Bayes' Theorem. Asymptotic Approximations for Binomial Random Variable, related problems.
11. Week	Functions of One Random Variable. The Random Variable $g(x)$, The Distribution of $g(x)$, Quantization Mean and Variance, Conditional Mean,

	Variance, Moments.
12. Week	Estimate of the Mean of g(x), Chebyshev Inequality, Markov Inequality, Characteristic Functions, Discrete type RV, Moment theorem, related problems
13. Week	Two Random Variables. Bivariate Distributions, Joint Density, Probability Masses, Independence, Discrete type RV, One Function of Two Random Variables I 6-3
14. Week	Two Functions of Two Random Variables, Joint Moments, Joint Characteristic Functions, Conditional Distributions, Conditional Expected Values and related problems.
15. Week	Introduction to Statistics. Introduction, Introduction to Estimation Theory, Parameter Estimation, Hypothesis Testing Problems.
16. Week	Final Exam

Assessment Method

Semester Works	Number	Contribution		
Attendance	14	%5		
Laboratory	0	%0		
Application	0	%0		
Fieldwork	0	%0		
Practice	0	%0		
Homework Assessment	4	%20		
Presentation	0	%0		
Project	0	%0		
Seminar	0	%0		
Mid-term Exams	1	%30		
Final Exam	1	%45		

Total	20	%100
Contribution of semester Works to success points	4	%55
Contribution of final exam to success points	1	%45
Total	19	%100

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	4	56
Presentation / Seminar Preparation			
Project			
Homework assignment	4	5	20
Midterms (Study duration)	1	15	15
Final Exam (Study duration)	1	20	20
Total Workload		1	153
Total Workload/30 hours			5.15
ECTS			5.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes Contribution		bution	n Level*		
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.				X	
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.				X	
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.				X	
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			

To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.	X			
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.		X		
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.			X	

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING AND ARCHITECTURE COMPUTER ENGINEERING DEPARTMENT

Course Name	Code	Sem.	Theory	Application	Laboratory	National	ECT	
			(hours/w eek)	(hours/week)	(hours/week)	Credit	S	
Programming Languages	CENG 241	Fall	3	0	0	3	6	
Prerequisites	None							
Course Language	English							
Course Type	Compuls	ory						
Mode of Delivery (face to face, distance learning)	Face to fa	Face to face/Distance Learning/Hybrid						
Learning and teaching strategies	Lecturing	Lecturing, discussion and submission.						
Instructor (s)	Ahmet S	erkan Ka	ırataş, PhD					
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. Pr	ogramm	ing Langua	ge Design Conc	epts, David A. V	Watt, John W	iley	

	& Sons, 2004
	2. The C++ (3rd Ed.), Bjarne Stroustrup, Addison Wesley Publishing Company, 1997
Learning	After taking this course students will be able to;
outcomes	1. know value and type systems used in different programming languages
	2. know the relations between variables and storage
	3. understand binding and scope strategies
	4. understand the importance of abstraction and means to achieve it
	5. understand control flow mechanisms used in programming languages belonging to different families

Subjects by weeks

Weeks	Subjects
1. Week	Introduction to programming languages
2. Week	Values & Types
3. Week	Values & Types
4. Week	Values & Types
5. Week	Variables & Storage
6. Week	Variables & Storage
7. Week	Mid- term exam
8. Week	Bindings & Scope

9. Week	Bindings & Scope
10. Week	Procedural Abstraction
11. Week	Procedural Abstraction
12. Week	Data Abstraction
13. Week	Data Abstraction
14. Week	Type Systems
15. Week	Control Flow
16. Week	Final Exam

Assessment Method

Number	Contribution
14	%0
0	%0
0	%0
0	%0
0	%0
3	%30
0	%0
0	%0
0	%0
1	%30
	14 0 0 0 0 0 3 0 0

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

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			
Homework assignment	3	15	45
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload			175

Total Workload/30 hours	5.83
ECTS	6.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes		Contri	bution	Level	*
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.					X
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.				X	
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.			X		
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.		X			
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.	X				
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.			X		
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.				X	
Information on business practices such as project management, risk management and change management; awareness about		X			

entrepreneurship and innovation; information on sustainable development.			
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.	X		

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

Course Name	Code	Semeste r	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	Nationa 1 Credit	EC TS		
Formal Languages and Automata Theory	CENG 256	Fall	3	0	0	3	5		
Prerequisites	None								
Course Language	English								
Course Type	Compuls	Compulsory							
Mode of Delivery (face to face, distance learning)	Face to f	Face to face/Distance Learning/Hybrid							
Learning and teaching strategies	Lecturin	Lecturing, discussion and submission.							
Instructor (s)	Mert ÖZ	ARAR, Ph	D						
Course objective		To teach the basics of formal languages, abstract machines and automata theory together with complexity analysis							
Course Content	• R	degular lang	guages and fini	ohabets and lante automata I pushdown automata ts and Turing r	tomata				

	 The language hierarchy Correspondence between grammars and automata Determinism vs. nondeterminism
References	Lewis, H.R and Papadimitriou, C.H. <i>Elements of the Theory of Computation</i> (2nd ed.), Prentice-Hall, 1998.
Learning outcomes	Computer Science needs mathematical languages to abstract away from particulars of computing machinery and to concentrate on 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	Midterm exam
8. Week	Context-free Languages, Parse Trees and Derivations
9. Week	Pushdown Automata Theory
10. Week	The Pumping Theorem and its Applications
11. Week	Correspondence between grammars and automata, Closure Properties
12. Week	Recursively enumerable sets and Linear Bounded Automata Theory
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	14	%5
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	%35
Total	18	%100
Contribution of semester Works to success points	3	% 65
Contribution of final exam to success points	1	%35
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

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.				X	
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.				X	
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.				X	
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X			

Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.		X		
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.			X	

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

Course Name	Code	Semester	Theory	Application	Laboratory	National	ECTS
			(hours/week)	(hours/week	(hours/week	Credit	
						_	
Web Design	CENG	Fall	3	0	0	3	5
and Programming	361						
Trogramming							
Prerequisites	Java-II						
Course	English						
Language							
Course Type	Compuls	sory					
Mode of	Face to f	ace/Distance	ce Learning/Hy	brid			
Delivery (face							
to face,							
distance							
learning)							
Learning and	Lecturin	g, discussio	on and submiss	ion.			
teaching							
strategies							
Instructor (s)	Ahmet C	COŞAR, Ph	D				
Course	To teach	the basics	of discrete ma	thematical stri	uctures		
objective			v				
Course Content	0 H	HTML					
	o J	avaScript					
	0 (CSS					
	0 H	HTTP					
	0 A	Ajax					

	 PHP XML, XSL DOM jQuery
References	Web Programming with HTML5, CSS, and JavaScript, John Dean, 2019.
Learning outcomes	After taking this course students will be able to; 1. design and build web pages 2. create web-based applications with Forms and Ajax 3. create web server side application codes

Subjects by weeks

Weeks	Subjects
1. Week	HTML
2. Week	HTML
3. Week	HTML
4. Week	CSS
5. Week	CSS
6. Week	JavaScript
7. Week	Midterm exam

8. Week	DOM
9. Week	Forms
10. Week	HTTP
11. Week	Ajax
12. Week	Web server side application
13. Week	DOM
14. Week	jQuery
15. Week	PHP
16. Week	Final Exam

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	0	0
Project	0	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

WORKLOAD AND ECTS CALCULATION

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

Total Workload/30 hours	4.88
ECTS	5.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes		Contribution Level*			
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.				X	
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.				X	
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.				X	
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X			
Information on business practices such as project management, risk management and change management; awareness about			X		

entrepreneurship and innovation; information on sustainable development.			
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.		X	

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

Course Name	Code	Semester	Theory (hours/ week)	Application (hours/week	Laboratory (hours/week)	National Credit	ECT S		
Operating Systems	CENG 301	Fall	3	0	0	3	6		
Prerequisites	None								
Course Language	English								
Course Type	Compuls	sory							
Mode of Delivery (face to face, distance learning)	Face to f	Face to face/Distance Learning/Hybrid							
Learning and teaching strategies	Lecturin	Lecturing, discussion and submission.							
Instructor (s)	Cevdet Dengi, PhD								
Course objective	To teach operating system concepts.								
Course Content	Operating Systems Overview, Process Management, Memory Management, Storage Management, Protection and Security								
References	 Abraham Silberschatz, Peter B. Galvin, Greg Gagne (2014): Operating System Concepts, 9th Edition, John Wiley & Sons. Andrew S. Tanenbaum, Herbert Boss (2014): Modern Operating 								

	Systems, 4th Edition, Pearson Education
Learning outcomes	After taking this course students will know about; 1. Operating system form and function
	2. Software structure: abstraction, modularity, interface vs. implementation, layers
	3. Concurrent execution: problems and solutions
	4. Storage and I/O: files, interrupts, and processes

Subjects by weeks

Weeks	Subjects
1. Week	
	Introduction to Operating Systems
2. Week	System Structures
3. Week	Process concept
4. Week	Multithreaded Programming
5. Week	Process Scheduling
6. Week	Synchronization and Deadlocks
7. Week	Mid- term exam
8. Week	Memory Management Strategies
9. Week	Virtual Memory Management

10. Week	File Systems
11. Week	Implementing File Systems
12. Week	Mass Storage Structure
13. Week	I/O Systems
14. Week	System Protection
15. Week	System Security
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	2	%20
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%40
Final Exam	1	%40
Total	18	%100

Contribution of semester Works to success	17	%60
points		
Contribution of final exam to success points	1	%40
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	2	8	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload		-	144
Total Workload/30 hours			4.88
ECTS			5.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*

	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.				X	
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.				X	
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.				X	
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X			
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.			X		
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.				X	
	l	1	<u> </u>	1	l

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week)	Laboratory (hours/week)	National Credit	ECT S
Computer Architecture	CENG 332	Fall	3	0	0	3	6
Prerequisites	None			<u> </u>		L	
Course Language	English	1					
Course Type	Compu	lsory					
Mode of Delivery	Face to face/Distance Education						
Learning and teaching strategies	Lectures, Problem Solving.						
Instructor (s)	Atila BOSTAN						
Course objective	To teach fundamental units and running principles of computer systems including memory, CPU and I/O units.						
Course Content	Computer components, Von Neumann architecture, instruction execution, interrupts, bus structure and interconnection of components, memory: internal memory, cache and virtual memory, external memories. CPU: ALU, floating point arithmetic, instruction sets, addressing modes and formats; control unit: hardwired and micro-programmed control units.						
References	 Randal E. Bryant and David R. O'Hallaron, Computer Systems: A Programmer's Perspective, International Edition, Pearson Higher Education, Second Edition, 2011 						

	 William Stallings, "Computer Organization and Architecture: Designing for Performance", 7/E, Prentice Hall, 2010, ISBN-10: 0135064171, ISBN-13: 9780135064177 David A. Patterson, John L. Hennessy, Computer organization and design (2nd ed.): the hardware/software interface, Morgan Kaufmann Publishers Inc., San Francisco, CA, 1998 Tanenbaum, Structured Computer Organization, 5/E, Prentice Hall, 2006, ISBN-10: 0131485210, ISBN-13: 9780131485211 Douglas E. Comer, Essentials of Computer Architecture: International Edition, Pearson Higher Education, 2005, ISBN-10: 0131964267, ISBN-13: 9780131964266 Nick Carter, Schaum's Outline of Computer Architecture 1st Edition (2002), ISBN: 9780071362078 			
Learning	After taking this course, students will be able to;			
_	Ther taking and course, stadents will be able to,			
outcomes	Describe structure of a computer system			
	Explain how units of a computer system work together			
	Recognize memory organization and its usage in computer systems			
	Use basics of internal data representation for data manipulation			
	Experiment with low level programming			
	Compare the performance of different computer architectures			
	 Develop assembly programs to better understand internal workings of a 			
	computer system			

Subjects by weeks

Weeks	Subjects
1	Overview of Computer System
2	Representing and Manipulating Information
3	Machine-Level Representation of Programs
4	The Y86 Instruction Set Architecture
5	Overview of Logic Design and the Hardware Control Language (HCL)
6	A Sequential Implementation
7	General Principles of Pipelining. Pipelined Implementations

8	Storage Technologies. The Memory Hierarchy. Locality
9	Cache Memories
10	Writing Cache-Friendly Code
11	Physical and Virtual Addressing. Address Spaces.
12	VM as a Tool for Caching. VM as a Tool for Memory Management. VM as a Tool for Memory Protection.
13	Address Translation. Memory Mapping. Dynamic Memory Allocation. Garbage Collection.
14	System-Level I/O
15	Review of topics and contemporary implementations
16	Review of topics and contemporary implementations

Assessment Method

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
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	%35
Final Exam	1	%45
Total	20	%100

Contribution of semester Works to success points	19	%65
Contribution of final exam to success points	1	%45
Total	20	%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	4	56
Presentation / Seminar Preparation			
Project			
Quizzes	4	10	40
Midterms (Study duration)	1	15	15
Final Exam (Study duration)	1	30	30
Total Workload		1	183
Total Workload/30 hours			6.1
ECTS			6.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*
------------------	---------------------

	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.				X	
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.		X			
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.	X				
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.			X		
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.	X				
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.	X				
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X			
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.	X				
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.		X			

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

Course Name	Code	Semester	Theory (hours/ week)	Application (hours/wee k)	Laboratory (hours/week)	National Credit	ECT S	
Computer Networks	CENG 336	Fall	3	0	0	3	5	
Prerequisites	None			1				
Course Language	English							
Course Type	Compulso	ory						
Mode of Delivery (face to face, distance learning)	Face to fa	Face to face/Distance Learning/Hybrid						
Learning and teaching strategies	Lecturing	Lecturing, discussion and submission.						
Instructor (s)	Yüksel A	RSLAN, Ph	D					
Course objective	To teach to computer	•	on of comp	outer networks	and how to des	sign comple	rx	
Course Content	0 Ex		echnologie and peer to	es, protocols of peer program	f each OSI laye ming	r		

References	(Main)Computer Networking, J.F. Kurose and K.W. Ross, 2010, Addison Wesley
	(Recommended) Computer Networks, L.L. Peterson and B.S.Davie, 2007, Morgan Kaufman
Learning	After taking this course students will be able to;
outcomes	1. know how computer networks and Internet work
	2. know how to design complex networks
	3. know how to design software running on computer networks

Subjects by weeks

Weeks	Subjects
1. Week	Introduction to computer networks. Open System Interface (OSI) seven model architecture description
2. Week	Physical layer, protocols, technologies and practical systems used at physical layer
3. Week	Data link layer, protocols, technologies, and practical systems used at physical layer
4. Week	Data link layer, protocols, technologies and practical systems used at physical layer (cntd.)
5. Week	Network layer, protocols, technologies and practical systems used at physical layer (cntd.)
6. Week	Network layer, protocols, technologies and practical systems used at physical layer (cntd.)
7. Week	Network layer, protocols, technologies and practical systems used at physical layer (cntd.)
8. Week	Midterm exam

9. Week	Transport layer, protocols, technologies, and practical systems used at physical layer (cntd.)
10. Week	Transport layer, protocols, technologies, and practical systems used at physical layer (cntd.)
11. Week	Transport layer, protocols, technologies, and practical systems used at physical layer (cntd.)
12. Week	Presentation layer
13. Week	Application Layer
14. Week	Application Layer (cntd.)
15. Week	Project demostrations
16. Week	Final Exam

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

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

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes		Contri	bution	Level*	:
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.		Х			
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.			х		
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.					Х
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.				Х	
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.			X		
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.			Х		
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.					Х
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.				Х	
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of		Х			

the legal consequences of engineering solutions.			

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

Course Name	Code	Semester	Theory (hours/week)	Application (hours/week	Laboratory (hours/wee k)	National Credit	ECT S		
Database Management Systems	CENG 351	Fall	3	0	0	3	5		
Prerequisites	Data Stru	ctures							
Course Language	English								
Course Type	Compulso	ory							
Mode of Delivery (face to face, distance learning)	Face to fa	Face to face/Distance Learning/Hybrid							
Learning and teaching strategies	Lecturing	Lecturing, discussion and submission.							
Instructor (s)	Ahmet Co	OŞAR, PhD							
Course objective	To teach the database management systems, Relational database design principles								
Course Content	о На о R 6	elational mo	dexing, B- del	ect Access tree indexing grams, 1NF, 2N	NF, 3NF, BCN	F, +NF			

	Relational algebra: select, project, join, division
	 Integrity constraints, Primary keys, Foreign keys
	o SQL query language
	Transaction management
	Concurrency control
	o Recovery
References	Database Management Systems, 3Ed, Raghu Ramakrishnan, 2018.
Learning	After taking this course students will be able to;
outcomes	design and build relational databases
	2. write relational SQL queries
	3. develop aplications systems using relational databases

Weeks	Subjects
1. Week	Files: sequential and direct access
2. Week	Hash-based indexing, B-tree indexing
3. Week	Relational model, ER diagrams
4. Week	Database design, 1NF, 2NF, 3NF, BCNF, 4NF
5. Week	Database design, 1NF, 2NF, 3NF, BCNF, 4NF
6. Week	Relational algebra: select, project, join, division

7. Week	Midterm exam
8. Week	Integrity constraints, Primary keys, Foreign keys, General constraints
9. Week	SQL query language
10. Week	SQL query language
11. Week	SQL query language
12. Week	Transaction management: commit, abort, recovery
13. Week	Concurrency control
14. Week	2 Phase Locking, Serializability
15. Week	Deadlock detection and prevention
16. Week	Final Exam

Semester Works	Number	Contribution (%)
Attendance	14	5
Laboratory	0	0
Application	0	0
Fieldwork	0	0
Practice	0	0
Homework Assessment	2	25

Presentation	0	0
Project	0	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

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

Program Outcomes	Contribution Level*				
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.				X	
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.				X	
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.				X	
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X			

Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.		X		
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.			X	

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING DEPARTMENT OF COMPUTER ENGINEERING

COURSE INFORMATION

Course Name	Code	Semeste	Theory	Application	Laboratory	National	ECTS
		r	(hours/w eek)	(hours/week	(hours/week	Credit	

Computer Graphics	CENG 378	Spring	3	0	0	3	6
Prerequisites	None						1
Course Language	English						
Course Type	Compuls	ory					
Mode of Delivery (face to face, distance learning)	Face to fa	ace/Distanc	e Learning	/Hybrid			
Learning and teaching strategies	Lecturing	g, discussion	n and subr	nission.			
Instructor (s)	Sarper A	LKAN, PhI)				
Course objective	CENG 378 introduces the basic concepts of computer graphics and demonstrates the application of computer science to the field of computer graphics. This course provides the studens with the necessary knowledge for developing and implementing computer graphics applications.						
Course Content	Human vision system. Images and displays. Texture mapping and ray-tracing. Modelling transformations. Fixed function pipelinge. Rasterization. Shading. Shadows. Computer graphics applications.						
References	Peter Shirley and Steve Marschner, "Fundamentals of Computer Graphics", 3rd Edition, A K Peters, 2009, ISBN 978-1568814698						
	2. Donald D. Hearn and M. Pauline Baker, "Computer Graphics with OpenGL", 3rd Edition, Prentice Hall, 2004, ISBN 978-0130153906						
	3. James D. Foley, Andries van Dam, Steven K. Feiner, and John F. Hughes, "Computer Graphics: Principles and Practice", 2nd Edition, Addison Wesley, 1995, ISBN 978-0201848403						
		like Bailey 009, ISBN 9		_	"Graphics Shad	ers", A K	Peters,
		•		eith Morley, "F 103, ISBN 978-	Realistic Ray Tr 1568814612	acing", 2nd	d

	6. Kevin Suffern, "Ray Tracing from the Ground Up", A K Peters, 2007, ISBN 978- 1568812724
Learning	After taking this course students will be able to;
outcomes	know hardware and software components of graphical systems
	2. know basic concepts of 2D and 3D geometric transformations
	understand two dimensional viewing: viewing pipelines clipping and windowing
	4. understand three dimensional viewing: projections, viewing pipelines, transformations clipping and surface detection
	5. know basics of illumination models and surface rendering

Weeks	Subjects
1. Week	
	Introduction to computer graphics and human vision system
2. Week	Review of mathematics: vectors, matrices, linear algebra, analytic geometry, lines planes
3. Week	Ray tracing
4. Week	Texture mapping
5. Week	Modeling transformations in ray tracing
6. Week	Mid- term exam
7. Week	Introduction to fixed function pipeline and transformations
8. Week	Rasterization

9. Week	Shading (Flat, Gouraud, Phong) and texture mapping
10. Week	Vertex and pixel shaders
11. Week	Mid-term exam
12. Week	Vertex and pixel shaders continued, Vertex arrays buffers and indexed rendering
13. Week	Shadows
14. Week	Shadow mapping and depth buffer
15. Week	Graphics in the real world Blender and unity
16. Week	Final Exam

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	2	%40
Final Exam	1	%30

Total	20	%100
Contribution of semester Works to success points	19	%70
Contribution of final exam to success points	1	%30
Total	20	%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	6	84
Presentation / Seminar Preparation			
Project			
Homework assignment	4	5	20
Midterms (Study duration)	1	10	10
Final Exam (Study duration)	1	10	10
Total Workload		1	166
Total Workload/30 hours			5.53
ECTS			6.00

Program Outcomes	Contribution Level*				
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.					X
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.					X
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.			X		
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.		X			
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.			X		
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X			
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.		X			
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.		X			

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

COURSE INFORMATION

Course Name	Code	Semeste	Theory	Application	Laboratory	National	ECT
		r	(hours/week	(hours/week	(hours/week	Credit	S

Intro. To Signal Processing for Comp. Engineers	CENG 384	Fall	3	0	0	3	5
Prerequisites	None	L				l	ı
Course Language	English						
Course Type	Compuls	ory					
Mode of Delivery (face to face, distance learning)	Face to fa	ace/Distanc	e Learning/H	ybrid			
Learning and teaching strategies	Lecturing	g, discussio	n and submiss	sion.			
Instructor (s)	Hakan Ç	ağlar, Asso	c. Prof.				
Course objective	signals a Understa character concepts systems equations (frequency represent impleme infinite-i filters (F	and the important discrete discrete of linearity in time done of an and in factories, and in factories discrete nation of impulse-respondent their manufactures of the impulse-respondent discrete of the impulse-respondent discrete of the impulse-respondent discrete of the impulse of the impu	portance and a Fourier transe-time signal are an are are are are are are are are are are	application of asforms (DFT). s. Z-transform and stability. Linconvolution (ir main use of dansforms (transforms using block systems. Under filters (IIR), areas. Know h	the Nyquist s) and be able s of discrete-t near time-invar npulse respons discrete-time F sfer functions) ck diagrams. derstand the b finite impulse fow to design f Fourier transfo	ampling the to use to use to use the courier transfer the courier transfer the courier transfer the courier transfer the courier transfer the courier transfer the courier transfer the courier transfer the courier transfer the courier transfer the courier transfer the course transfer the course transfer transfer transfer the course transfer tra	theorem. them to als. The ete-time fference insforms how to les for eepts of digital infinite
Course Content	o Li o Fi	inear Time i requency Do	omain Repres	ems, Sampling	Theorem, Nyo crete-Time Sig s applications	-	stems

	 Block Transform & Signal Flow Graph Representation of LTI Systems, Difference Equations
	 Digital Filter Design, IIR & FIR Filters and their applications
	 Discrete Fourier Transform (DFT) & Fast Fourier Transform (FFT)
	 Linear Convolution of two Signals, Circular convolution with Aliasing
References	7
References	Discrete-Time Signal Processing, 3rd edition, Alan V. Oppenheim and Ronal W. Schafer, 2013 Pearson Education ISBN10: 1292025727
Learning	 After taking this course students will be able to;
outcomes	o Understand basics of discrete-time signal, convolution, impulse and
	frequency response concepts for linear, time-invariant (LTI) systems,
	difference equation realization of LTI systems and discrete-time Fourier
	transform and basic properties of these.
	o Understands periodic sampling of analog signals and the relation between
	Fourier transforms of the sampled analog signal and the resulting sampled discrete-time signal.
	o Z-Transform and inverse Z-Transform, and their applications. Solution for
	difference equation by using z-Transforms.
	 Understands signal flow graph and block diagram representations of difference equations that realize digital filters, for IIR filter realization &
	for FIR filter realization.
	o Understands definitions and basic properties of forward and inverse
	discrete Fourier transform and their computation by fast algorithms, namely FFT.
	o Learns basic digital signal processing application on 1-D speech signal, 2-
	D image and 3-D video signals.

Weeks	Subjects

1. Week	Introduction. Discrete-time signals: Sequences, Discrete-time Systems in the time domain. Discrete-time systems in the time domain. Linear time-invariant systems, properties of Linear time-invariant systems. Linear constant-coefficient difference equations. Memoryless systems, Causability, Stability.
2. Week	Frequency domain representation of discrete-time signals and systems. Fourier Transforms of discrete-time signals. Eigen functions for Linear time-invariant systems, output for complex exponentials.
3. Week	Discrete Time Fourier Transforms (DTFT) and properties. Fourier Transform Theorems, Parseval's theorem, Convolution theorem, Modulation or Windowing theorem. Time shifting and Frequency shifting.
4. Week	
5. Week	Introduction to Z- transform. Convergence for the z-Transform. Inverse z-Transforms. Z-Transforms properties; Linearity, Time Shifting, Multiplication by Exponential sequence, Time reversal. Differentiation of X(z). Convolution of discrete sequences.
	Sampling of Continuous-Time Signals. Frequency-domain representation of sampling. Sampling theory. Nyquist Rate. Reconstruction of bandlimited signals from its samples.
6. Week	Discrete-time processing of analog signals. Analog to digital (A/D) conversion and analysis of quantization error. Digital to Analog conversion (D/A). Multirate signal processing. Decimation and interpolation filters.
7. Week	Transform analysis of linear time-invariant systems. Frequency response of LTI systems. System functions for systems characterized by linear constant-coefficient difference equation. Linear systems with linear phase.
8. Week	Midterm Exam
9. Week	Structures for Discrete-Time Systems. Block Diagram representation of linear constant-coefficient difference equations, Signal flow graph representation of linear constant-coefficient difference equations. Basic structures for IIR Filters, and basic structures for FIR Filters. Direct form and cascaded form.
	Discrete Filter Design Techniques. Design of discrete-time IIR filters from continuous-time filters, Bilinear transformation design. Design of FIR filter by

	windowing. Optimum approximation of FIR filters.
10. Week	
11. Week	Discrete Fourier Transform (DFT). Representation of periodic sequences: Discrete Fourier Series. Properties of the Discrete Fourier series. Dicrete Fourier transforms and their properties. Linear convolution using DFT. Discrete Cosine Transforms (DCT) and applications.
12. Week	Computation of the Discrete Fourier Transform. Efficient computation of the Discrete Fourier transform. Fast Fourier Transform (FFT) algorithms. Practical considerations and applications.
13. Week	Project presentations
14. Week	Project presentations
15. Week	Project presentations
16. Week	Final Exam

Semester Works	Number	Contribution
Attendance	14	%5
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	4	%10
Presentation	1	%0

Project	1	%20
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	22	%100
Contribution of semester Works to success points	21	%60
Contribution of final exam to success points	1	%40
Total	22	%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	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

Program Outcomes	Contribution Level*				
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.				X	
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.				X	
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.				X	
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X			
Information on business practices such as project management, risk management and change management; awareness about			X		

entrepreneurship and innovation; information on sustainable development.			
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.		X	

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

COURSE INFORMATION

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

Software Engineering	SENG 211	Fall	3	0	0	3	5			
Prerequisites	None	None								
Course Language	English	English								
Course Type	Compul	sory								
Mode of Delivery (face to face, distance learning)		Face to face/Distance Learning/Hybrid								
Learning and teaching strategies	Lecturin	ng, discussio	on and submis	ssion.						
Instructor (s)	Hakan Ç	Çağlar, Asso	oc. Prof.							
Course objective	software first, pro importate examine software specificate docume	The objective of this course is to provide students 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 software project. Then, each of the phases is examined in detail, in order 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. More, this course enables students to realize software specification and design phases of sample projects.								
Course Content	• \$ • \$ • \$ • \$ • \$ • \$ • \$ • \$ • \$ • \$	SW develop SW gates (S Requiremen	oment process SRR, CDR, TI It Engineering oftware engineture gineering	es RR) IEEE sta	code of ethics	ımentation				

	CASE tolls
	SW application development, Re-use, Legacy systems, RMA analysis
References	Software Engineering 10th Edition by Ian Sommerville, Pearson Education, 2015 ISBN: 9781292096131 Software Engineering A PRACTITIONER' S APPROACH 8th Edition by Roger S. Pressman, Bruce R. Maximm Mc Graw Hill Education
Learning outcomes	After taking this course students will be able to; Define engineering, software, computer and system engineering Define software processes Gather the software requirements Define software design and architecture Learn the software verification and validation

Weeks	Subjects
1. Week	Introduction to software engineering, FAQs about software engineering, costs of software engineering, activity cost distribution, attributes of good sw, key challenges facing sw 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, characteristis end responsibilities, systems engineering activities across system life cycle, key system engineering concepts, context diagrams, system boundries & 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 requiremets for?, Requiremets analysis task areas and requirement analysis questions,
6. Week	Types of requirements (functional, performance, state/mod, interface ect.), requirements measures (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	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.
8. Week	Midterm Exam
9. Week	Software Project planning, project management plan (PMP), Critical Milestones, activities & review meetings (SRR, SDR, PDR, CDR, TRR),
10. Week	System & software architecture (central, distributed), software design, software design description (SDD), software modelling, UML diagrams, use cases and boundaries, software design tools.
11. 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 managements, version management & control.
12. Week	Project presentations
13. Week	Project presentations

14. Week	Project presentations
15. Week	Project presentations
16. Week	Final Exam

Semester Works	Number	Contribution
Attendance	14	%5
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	2	%15
Presentation	0	%0
Project	1	%30
Seminar	0	%0
Mid-term Exams	1	%20
Final Exam	1	%30
Total	19	%100
Contribution of semester Works to success points	4	%70
Contribution of final exam to success points	1	%30
Total	19	%100

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	3	42
Presentation / Seminar Preparation			
Project	14	3	42
Homework assignment	2	2	4
Midterms (Study duration)	1	10	10
Final Exam (Study duration)	1	15	15
Total Workload			155
Total Workload/30 hours			5.15
ECTS			5.00

Program Outcomes	nes Contribution Level*		•		
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and				X	

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

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING DEPARTMENT OF SOFTWARE ENGINEERING

COURSE INFORMATION

Course Name	Code	Semester	Theory	Application	Laboratory	National	ECT
			(hours/wee	(hours/week	(hours/week		

			k)))	Credit	S
Software Requirements Engineering	SENG 311	Spring	3	0	0	3	6
Prerequisites	None						
Course Language	English						
Course Type	Compuls	ory					
Mode of Delivery (face to face, distance learning)	Face to face/Distance Learning/Hybrid						
Learning and teaching strategies	Lecturing, discussion and submission.						
Instructor (s)	Sarper A	LKAN, PhI)				
Course objective	To teach the fundamentals of software requirements engineering						
Course Content	The role of software requirements engineering in the software development process flow. Mission statement, customers, and stakeholders. Elicitation of software requirements. Writing a requirements document. Risk management of software requirements. Requirements validation and verification. Formal methods. Requirements specification and agile methods. Requirements management and value engineering.						
References	Wiegers, Karl, and Joy Beatty. Software requirements. Microsoft Press, 2013. ISBN-13: 978-0735679665						
	2. Laplante, Phillip A. Requirements engineering for software and systems (3rd edition). CRC Press, 2017. ISBN-13: 978-1138196117						
Learning	After tak	ing this cou	rse students	will be able to;			
outcomes	1. U	nderstand th	e concept of	software requi	rements and it	s role in soft	ware

development lifecycle
2. know basic requirements elicitation techniques
3. know how to write a software requirements document
4. understand requirements risk management
5. understand agile methodologies
6. understand value engineering of requirements

Introduction to software requirements engineering
Missien statement, customers, and stakeholders
Requirements elicitation
Writing requirements document
IEEE standards for software requirements
Requirements risk management
Mid-term exam
Standards for verification and validation
Formal methods

10. Week	Examples of formal methods: category theory, model checking
11. Week	Requirements specification and agile methodologies
12. Week	Tool support for requirements engineering
13. Week	Requirements management
14. Week	Value engineering of requirements
15. Week	Value engineering of requirements continued
16. Week	Final Exam

Semester Works	Number	Contribution
Attendance	14	%0
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	4	%30
Presentation	0	%0
Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%30
Final Exam	1	%40
Total	20	%100

Contribution of semester Works to success points	19	%60
1		
Contribution of final exam to success points	1	%40
Total	20	%100

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	6	84
Presentation / Seminar Preparation			
Project			
Homework assignment	4	4	16
Midterms (Study duration)	1	8	8
Final Exam (Study duration)	1	16	16
Total Workload		<u> </u>	166
Total Workload/30 hours			5.53
ECTS			6.00

Program Outcomes	Contribution Level*

	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.		X			
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.		X			
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.				X	
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.			X		
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.		X			
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.					X
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.				X	
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.			X		
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.					X
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.		X			
	l	1	l	<u> </u>	1

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

COURSE INFORMATION

Course Name	Code	Semester	Theory	Applicatio	Laboratory	National	ECTS
			(hours/w eek)	n (hours/wee	(hours/week	Credit	

				k)							
Software Design Patterns	SENG 324	Spring	3	0	0	3	5				
Prerequisites	None	None									
Course Language	English	English									
Course Type	Compuls	ory									
Mode of Delivery (face to face,distance learning)	Face to fa	ace/Distance	Learning/l	Hybrid							
Learning and teaching strategies	Lecturing, discussion and submission.										
Instructor (s)	Yüksel A	RSLAN, Phl	D								
Course objective	architect	v	and mainte		h the knowledg ex software sys	•					
Course Content											
References	Head First O'Reilly	_	terns, Eric	Freeman, Elis	sabeth Freemar	n, Bert Bates	S,				
Learning outcomes	1. ki 2. ki	now architect	ing effecti nale and b		o; inable complex gn patterns in a		ystems				

Weeks	Subjects
1. Week	Welcome to design patterns
2. Week	A refresher on Object-Oriented Design and UML
3. Week	Observer pattern
4. Week	Decorator pattern
5. Week	Factory pattern
6. Week	Singleton pattern
7. Week	Command pattern
8. Week	Midterm exam
9. Week	Adapter pattern
10. Week	Iterator pattern
11. Week	State pattern
12. Week	Proxy pattern
13. Week	Model view controller
14. Week	Patterns in real world
15. Week	Project demostrations

16. Week	Final Exam

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

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

Program Outcomes	Contribution Level*					
	1	2	3	4	5	
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.		X				
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X	
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.					X	
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X		
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.			X			
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.			X			
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.			X			
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X				
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.			X			
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.	X					
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of	X					

the legal consequences of engineering solutions.			

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING SOFTWARE ENGINEERING DEPARTMENT

COURSE INFORMATION

Course Name	Code	Semester	Theory	Application	Laboratory	National	ECTS				
			(hours/w eek)	(hours/week)	(hours/week)	Credit					
Object Oriented Software Eng.	SENG 244	Fall	3	0	0	3	6				
Prerequisites	None										
Course Language	English										
Course Type	Compuls	Compulsory									
Mode of Delivery (face to face, distance learning)	Face to f	Face to face/Distance Learning/Hybrid									
Learning and teaching strategies	Lecturin	Lecturing, discussion and submission.									
Instructor (s)	Cevdet I	Dengi, PhD									
Course objective		To teach software engineering concepts using object oriented programming paradigm.									
Course Content	Modelling, Requirement Analysis, Design, Testing, Configuration Management, Project Management, Software Life Cycle										
References	1. B	1. Bernd Bruegge and Allen H. Dutoit (2010): Object-Oriented Software									

	Engineering Using UML, Patterns, and Java, 3rd edition. Pearson 2. Timothy C. Lethbridge and Robert Laganiere (2001): Object-Oriented Software Engineering, 2nd edition. McGraw-Hill 3.
Learning	After taking this course students will be able to;
outcomes	 Analyze, design and develop a system within the framework of the systems engineering lifecycle.
	 Apply tools and methodologies, including project management, relevant to industry-standard modelling methodologies and object oriented programming.
	3. Analyze system quality, risk and reliability, and standards applied in the development of systems.
	4. Explain, evaluate and critique own work in a team and that of team members.

Subjects by weeks

Weeks	Subjects
1. Week	
	Introduction to Software Engineering
2. Week	Modeling with UML
3. Week	Project Organization and Communication
4. Week	Requirements Elicitation
5. Week	Analysis
6. Week	System Design

7. Week	Mid- term exam
8. Week	Object Design: Reusing Pattern Solutions
9. Week	Object Design: Specifying Interfaces
10. Week	Mapping Models to Code
11. Week	Testing
12. Week	Rationale Management
13. Week	Configuration Management
14. Week	Project Management
15. Week	Software Life Cycle
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	2	%20
Presentation	0	%0

Project	0	%0
Seminar	0	%0
Mid-term Exams	1	%40
Final Exam	1	%40
Total	18	%100
Contribution of semester Works to success points	17	%60
Contribution of final exam to success points	1	%40
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	2	8	28
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload		•	144

Total Workload/30 hours	4.88
ECTS	5.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes		Contri	bution	Level*	:
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.				X	
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.				X	
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.		X			
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.				X	
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.		X			
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.		X			
Information on business practices such as project management, risk management and change management; awareness about			X		

entrepreneurship and innovation; information on sustainable development.			
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of the legal consequences of engineering solutions.		X	

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING AND ARCHITECTURE SOFTWARE ENGINEERING DEPARTMENT

COURSE INFORMATION

Course Name	Code	Semester	Theory	Application	Laboratory	National	ECT			
			(hours/w eek)	(hours/week)	(hours/week	Credit	S			
Software Validation and Verification	SENG 322	Spring	3	0	0	3	6			
Prerequisites	None									
Course Language	English									
Course Type	Compul	Compulsory								
Mode of Delivery (face to face, distance learning)	Face to	Face to face/Distance Learning/Hybrid								
Learning and teaching strategies	Lecturin	Lecturing, discussion and submission.								
Instructor (s)	A. S	erkan Karaka	ış, Dr.							
Course objective	_	To provide an understanding on the place of software verification and validation throughout the software life cycle while focusing particularly on software testing								
Course Content	Basic concepts in software verification and validation, software testing techniques (black-box testing, white-box testing, etc.), test adequacy and coverage criteria, automated testing tools and techniques, testing lifecycle and test management, non-functional testing, formal methods for software									

	verification
References	Mauro Pezzè, Michal Young: Software Testing and Analysis: Process, Principles and Techniques, Wiley, ISBN 0471455938
Learning outcomes	After taking this course students will be able to; 1. Understand and apply the concepts and theory related to software verification and validation 2. Identify and use different testing techniques and design test plans 3. Use various testing frameworks and testing tools

Subjects by weeks

Weeks	Subjects
1. Week	
	Introduction to software verification and validation
2. Week	Challenges in software testing
3. Week	Specification-based testing
4. Week	Structural and syntax-based testing
5. Week	Model-checking
6. Week	Model-based testing
7. Week	Mid- term exam
8. Week	Fault-based testing

9. Week	Static and dynamic validation techniques
10. Week	Run-time verification
11. Week	Automated testing tools
12. Week	Management of the testing process
13. Week	Test documentation
14. Week	Software quality metrics
15. Week	Software testing in the lifecycle and code inspections
16. Week	Final Exam

Assessment Method

Number	Contribution
14	%0
0	%0
0	%0
0	%0
0	%0
4	%40
0	%0
0	%0
0	%0
1	%25
	14 0 0 0 0 0 4 0 0

Final Exam	1	%35
Total	20	%100
Contribution of semester Works to success points	19	%65
Contribution of final exam to success points	1	%35
Total	20	%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	4	15	60
Midterms (Study duration)	1	2	2
Final Exam (Study duration)	1	2	2
Total Workload		1	176
Total Workload/30 hours			5.87
ECTS			6.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*				
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.					X
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.				X	
An ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.		X			
Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems in engineering applications; ability to use information technologies effectively.				X	
Ability to design, conduct experiments, collect data, analyze and interpret results to investigate complex engineering problems or discipline-specific research topics.					X
Ability to work effectively in disciplinary and multidisciplinary teams; self-study skills.			X		
Ability to communicate effectively in verbal and written Turkish; knowledge of at least one foreign language; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions and receiving skills.			X		
Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology, and constantly renew oneself.			X		
To act in accordance with the ethical principles, professional and ethical responsibility awareness; information about standards used in engineering applications.			X		
Information on business practices such as project management, risk management and change management; awareness about entrepreneurship and innovation; information on sustainable development.				X	
Information about the effects of engineering applications on health, environment and safety in universal and social dimensions and the problems reflected in the engineering field of the age; awareness of		X			

the legal consequences of engineering solutions.			

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/w eek)	Applicatio n (hours/wee k)	Laboratory (hours/wee k)	National Credit	ECTS
Software Project Management	SENG 442	Fall	3	0	0	3	5
Prerequisites	None						
Course Language	English						
Course Type	Compul	sory					
Mode of Delivery (face to face, distance learning)	Face to	face/Distance	e Learning/F	Hybrid			
Learning and teaching strategies	Lecturin	Lecturing, discussion and submission.					
Instructor (s)	Hakan Ç	Cağlar, Assoc	e. Prof.				
Course objective	consider develope sufficier	ring both pra ment will be nt knowledge	ctical and the studied in dealer about softw	eoretical aspe etails. By taki	roject manage cts for large so ng this course, anagement me alizing.	cale software , you will ge	e t
Course Content	0 \$	Development Sizing & cost Project plann	t estimation	gies reakdown stru	ctures (WBS)		

	Project risk management
	 Quality management, ISO 900x, CMMI
	o Configuration & change management
	 Project performance tracking & monitoring
	Team management & organization
References	Project Management: A Systems Approach to Planning, Scheduling, and Controlling, Harold Kerzner, 8th Ed., John Wiley & Sons, 2003.,
	Software Engineering 10th Edition by Ian Sommerville, Pearson Education, 2015 ISBN: 9781292096131
	A Guide to the Project Management Body of Knowledge PMBOK® Guide2000, 3rd Edition, PMI, 2001.
Learning	After taking this course students will be able to;
outcomes	1. know discrete maths
	2. know basic concepts of data structures
	3. understand the building blocks of computer science

Subjects by weeks

Weeks	Subjects
1. Week	Introduction to software project management, what is software project, large scale software project complexity, case studies of successful and failed software projects, software ethics.
2. Week	Development methodologies; Waterfall, V Model, Spiral, Incremental, Prototyping, Agile development, pros and cons.
3. Week	Size & cost estimation, cost-benefit analysis, cash-flow forecasting, net present value (NPV), Function point analysis (FPA), COCOMO software sizing estimation, Line of code (LOC) estimation

4. Week	Software project planning, project scope and objectives, estimate effort for activity, resource allocation, project planning case tools (MS projects,)
5. Week	Work Breakdown Structures (WBS) & Product Breakdown Structure (PBS) decomposition of system, project scheduling, critical path method.
6. Week	Project risk management, common project risks, risk idetification, estimation, evaluation, risk management, education strategies, Risk monitoring, risk avoidance and transfer.
7. Week	Software metric plan, software metrics, quality metrics, progress metric, sizing metrics, metric plan management
8. Week	Midterm Exam
9. Week	Software Quality management, ISO 900x family standards, Quality control vs quality assurance, SEI Capability Maturity Model Integration (CMM-I), CMM history, process models, Maturity Models (CMM 5 level definition), Kay process areas Key practices
10. Week	SW project performance tracking & monitoring, monitoring framework & check points, Ghann charts & Slip charts methods. Earn Value Analysis (EVA), schedule performance index (SPI), cost performance index (SPI), estimation to complete (ETC), project re-planning.
11. Week	Configuration management & change management, SW changes (corrective, adaptive, perfective, preventive), configuration management aspects (identification, control & change management, auditing, accounting). Baseline & vision management
12. Week	Project team management & organization, organizational planning, roles & responsibilities, monitoring & team management, organization & stuff acquisition, team development, staff requirements, stakeholder analysis, organization charts.
13. Week	Project presentations
14. Week	Project presentations
15. Week	Project presentations

16. Week	Final Exam

Assessment Method

Semester Works	Number	Contribution
Attendance	14	%5
Laboratory	0	%0
Application	0	%0
Fieldwork	0	%0
Practice	0	%0
Homework Assessment	2	%15
Presentation	0	%0
Project	1	%30
Seminar	0	%0
Mid-term Exams	1	%20
Final Exam	1	%30
Total	19	%100
Contribution of semester Works to success points	4	%70
Contribution of final exam to success points	1	%30
Total	19	%100

WORKLOAD AND ECTS CALCULATION

Activities	Number	Duration (hour)	Total Workload
Course Duration (x14)	14	3	42
Laboratory			
Application			
Specific practical training			
Field activities			
Study Hours Out of Class (Preliminary work, reinforcement, preparation for the exams)	14	3	42
Presentation / Seminar Preparation			
Project	14	3	42
Homework assignment	2	2	4
Midterms (Study duration)	1	10	10
Final Exam (Study duration)	1	15	15
Total Workload		l	155
Total Workload/30 hours			5.15
ECTS			5.00

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*			:	
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.				X	
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.					X

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

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

ANKARA SCIENCE UNIVERSITY FACULTY OF ENGINEERING COMPUTER ENGINEERING DEPARTMENT

COURSE INFORMATION

Course Name	Code	Semester	Theory (hours/	Application (hours/wee	Laboratory (hours/wee	National Credit	ECTS	
			week)	k)	k)			
Machine Learning	SENG 3xx	Fall/ Spring	3	0	0	3	5	
Prerequisites	None							
Course Language	English							
Course Type	Technic	al Elective						
Mode of Delivery (face to face, distance learning)	Face to	face/Distand	ce Learning	g/Hybrid				
Learning and teaching strategies	Lecturin	Lecturing, discussion and submission.						
Instructor (s)	Yüksel	ARSLAN, I	PhD					
Course objective	To teach	h basics of n	nachine lea	arning				
Course Content	Supervised and unsupervised learning algorithms, applying these algorithms to real world problems.							
References	For each Internet		this course	e students can	find numerous	s resources in	the	
Learning outcomes				nts will be able nsupervised le		nms		

2. Best practices in machine learning

Subjects by weeks

Weeks	Subjects
1. Week	Introduction to machine learning, linear algebra review
2. Week	One variable and multivariable regression
3. Week	Octave, Matlab, Python tutorial
4. Week	Logistic regression
5. Week	Regularized logistic regression
6. Week	Neural networks
7. Week	Neural networks: Learning
8. Week	Midterm exam
9. Week	Improving machine learning algorithm
10. Week	Support vector machines
11. Week	Unsupervised learning
12. Week	Anomaly detection
13. Week	Gaussian mixture models

14. Week	Hidden markov models
15. Week	Application example: Photo OCR
16. Week	Final Exam

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
		1

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

THE COURSE LEARNING OUTCOMES - PROGRAM OUTCOMES MATRIX

Program Outcomes	Contribution Level*			:	
	1	2	3	4	5
Qualified knowledge of mathematics, science and related engineering discipline; ability to use theoretical and practical knowledge in these areas in complex engineering problems.					X
An ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.				X	

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

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