FINAL INTERNATIONAL UNIVERSITY

FACULTY OF ENGINEERING

SOFTWARE ENGINEERING Program of Courses

Course categories: UC = University Core; FC = Faculty Core; AC = Area Core; AE = Area Elective; FE = Faculty Elective; UE = University Elective

Semester	Course Code	Course Title	Course Category	Hours			Total Credit	Pre-requisite	ECTS Credit
				Lecture	Tutorial	Lab/Prac.			
1	MATH123	DISCRETE MATHEMATICS	FC	3	1	0	3	-	5
1	PHYS121	PHYSICS-I	FC	3	1	1	4	-	5
1	MATH121	CALCULUS-I	FC	3	2	0	4	-	6
1	ENGR101	INFORMATION TECHNOLOGY AND APPLICATIONS	FC	2	0	1	2	-	2
1	ENGR103	COMPUTER PROGRAMMING-I	FC	2	0	2	3	-	5
1	ENGL121	ENGLISH-I	UC	3	0	0	3	-	4
1	TUOG101 / TURK131	TURKISH LANGUAGE-I / TURKISH AS A FOREIGN LANGUAGE-I	UC	2	0	0	2	-	3
		Total 7 courses	**TOTAL:**	**18**	**4**	**4**	**21**		**30**
2	MATH122	CALCULUS-II	FC	3	2	0	4	MATH121	6
2	MATH124	LINEAR ALGEBRA	FC	3	1	0	3	-	5
2	PHYS122	PHYSICS-II	FC	3	1	1	4	PHYS121	5
2	ENGR104	COMPUTER PROGRAMMING-II	FC	2	0	2	3	ENGR103	4
2	ENGL122	ENGLISH-II	UC	3	0	0	3	ENGL121	4
2	TARH101 / HIST111	ATATURK'S PRINCIPLES AND HISTORY OF TURKISH REFORMS-I	UC	2	0	0	2	-	3
2	TUOG102 / TURK132	TURKISH LANGUAGE-II / TURKISH AS A FOREIGN LANGUAGE-II	UC	2	0	0	2	- / TURK131	3
		Total 7 courses	**TOTAL:**	**18**	**4**	**3**	**21**		**30**
3	ELEE211	DIGITAL LOGIC DESIGN	AC	3	0	2	4	-	6
3	ELEE231	CIRCUIT THEORY-I	AC	3	0	2	4	MATH124, PHYS122	6
3	CMPE215	ALGORITHMS AND DATA STRUCTURES	AC	3	0	1	3	ENGR104	6
3	MATH225	DIFFERENTIAL EQUATIONS	FC	4	0	0	4	MATH121, MATH124	5
3	TARH102 / HIST112	ATATURK'S PRINCIPLES AND HISTORY OF TURKISH REFORMS-II	UC	2	0	0	2	-	3
3	UNIEXX1	UNIVERSITY ELECTIVE	UE	X	X	X	3	-	4
		Total 6 courses	**TOTAL:**	**15**	**0**	**5**	**20**		**30**
4	CMPE216	OBJECT ORIENTED PROGRAMMING	AC	2	0	2	3	ENGR104	6
4	CMPE232	OPERATING SYSTEMS	AC	3	0	0	3	ENGR104	6
4	CMPE252	ANALYSIS OF ALGORITHMS	AC	3	0	2	4	CMPE215	6
4	ENGR215	RESEARCH METHODS FOR ENGINEERING AND ARCHITECTURE	FC	2	0	0	2	-	3
4	STAT226	PROBABILITY AND STATISTICS	FC	3	1	0	3	MATH121	6
4	OHSA206	OCCUPATIONAL HEALTH AND SAFETY	FC	3	0	0	3	-	3
		Total 6 courses	**TOTAL:**	**16**	**1**	**4**	**18**		**30**
5	CMPE321	MICROPOCESSORS	AC	3	0	2	4	-	6
5	CMPE341	DATABASE SYSTEMS	AC	3	0	2	4	CMPE215	5
5	SFWE343	SOFTWARE ANALYSIS AND DESIGN	AC	2	0	2	3	CMPE216	5
5	SFWE315	VISUAL PROGRAMMING	AC	2	0	2	3	CMPE216	5
5	ENGRXX1	FACULTY ELECTIVE	FE	X	X	X	3	-	5
5	UNIEXX2	UNIVERSITY ELECTIVE	UE	X	X	X	3	-	4
		Total 6 courses	**TOTAL:**	**10**	**0**	**8**	**20**		**30**
6	SFWE344	SOFTWARE PROJECT MANAGEMENT	AC	2	0	1	2	SFWE343	4
6	MATH328	NUMERICAL ANALYSIS	FC	3	1	0	3	MATH124, MATH225	6
6	SFWEXX1	AREA ELECTIVE	AE	X	X	X	3	-	6
6	ENGRXX2	FACULTY ELECTIVE	FE	X	X	X	3	-	5
6	ENGRXX3	FACULTY ELECTIVE	FE	X	X	X	3	-	5
6	UNIEXX3	UNIVERSITY ELECTIVE	UE	X	X	X	3	-	4
		Total 6 courses	**TOTAL:**	**5**	**1**	**1**	**17**		**30**
7	SFWE403	SUMMER TRAINING	AC	0	0	0	0	-	2
7	ENGR401	ENGINEERING DESIGN-I	FC	1	2	0	2	-	6
7	SFWE415	SOFTWARE ARCHITECTURE	AC	3	0	1	3	SFWE343	6
7	SFWEXX2	AREA ELECTIVE	AE	X	X	X	3	-	6
7	SFWEXX3	AREA ELECTIVE	AE	X	X	X	3	-	6
7	UNIEXX4	UNIVERSITY ELECTIVE	UE	X	X	X	3	-	4
		Total 6 courses	**TOTAL:**	**4**	**2**	**1**	**14**		**30**
8	SFWE411	SOFTWARE VALIDATION AND TESTING	AC	3	0	1	3	SFWE343	6
8	ENGR402	ENGINEERING DESIGN-II	FC	0	4	2	3	ENGR401	10
8	ENGR404	ENGINEERING ATTRIBUTES AND ETHICS	FC	2	0	0	2	-	3
8	SFWEXX4	AREA ELECTIVE	AE	X	X	X	3	-	6
8	ENGRXX4	FACULTY ELECTIVE	FE	X	X	X	3	-	5
		Total 5 courses	**TOTAL:**	**5**	**4**	**3**	**14**		**30**
			GRAND TOTAL:	**91**	**16**	**29**	**145**		**240**

Area and Faculty Elective Courses

No.	Course Code	Course Title	Course Category	Hours			Total Credit	Pre-requisite	ECTS Credit
				Lecture	Tutorial	Lab/Prac.			
1	SFWE316	INTERNET AND WEB PROGRAMMING	AE	2	0	2	3	CMPE216	6
2	SFWE434	CRYPTOGRAPHY	AE	3	0	0	3	-	6
3	SFWE412	SOFTWARE QUALITY ASSURANCE	AE	3	0	0	3	-	6
4	SFWE422	MOBILE APPLICATION DEVELOPMENT	AE	3	0	0	3	-	6
5	SFWE431	HUMAN-COMPUTER INTERACTION	AE	3	0	0	3	-	6
6	SFWE441	ADVANCE DATABASE	AE	3	0	0	3	-	6
7	SFWE442	OBJECT-ORIENTED PROGRAMMING LANGUAGE AND SYSTEMS	AE	3	0	0	3	-	6
9	SFWE445	RAPID APPLICATION DEVELOPMENT	AE	3	0	0	3	-	6
10	SFWE451	INFORMATION RETRIEVAL	AE	3	0	0	3	-	6
11	SFWE467	DATA MINING	AE	3	0	0	3	-	6
12	SFWE475	ADVANCED WEB PROGRAMMING	AE	3	0	0	3	CMPE216	6
13	SFWE472	COMPUTER GRAPHICS	AE	3	0	0	3	-	6
14	SFWE474	INTRODUCTION TO PARALLEL COMPUTING	AE	3	0	0	3	-	6
15	CMPE431	ADVANCED COMPUTER NETWORKS	FE	3	0	0	3	-	6
16	CMPE432	WIRELESS COMMUNICATION NETWORKS	FE	3	0	0	3	-	6
17	CMPE433	WIRELESS SENSOR NETWORKS	FE	3	0	0	3	-	6
18	CMPE461	COMPUTING SYSTEMS	FE	3	0	0	3	-	6
20	CMPE463	CLOUD COMPUTING	FE	3	0	0	3	-	6
21	CMPE464	ARTIFICIAL INTELLIGENCE	FE	3	0	0	3	-	6
22	CMPE465	NEURAL NETWORKS	FE	3	0	0	3	-	6
23	CMPE466	EXPERT SYSTEMS	FE	3	0	0	4	-	6
24	CHEM121	CHEMISTRY	FE	2	1	2	3	-	5
25	MATH228	ENGINEERING MATHEMATICS	FE	3	1	0	3		6
26	ELEE341	ELECTRONICS-I	FE	3	0	2	4	-	6
27	ELEE331	SIGNALS AND SYSTEMS	FE	3	2	0	4	-	6
28	ELEE362	COMMUNICATION SYSTEMS	FE	3	0	0	3	-	5
29	ELEE431	DIGITAL SIGNAL PROCESSING	FE	3	0	0	3	-	6
30	CMPE322	DATA COMMUNICATION AND COMPUTER NETWORKS	FE	3	0	2	4	-	6
31	AINE301	BASIC SEARCH METHODS	FE	3	0	0	3	MATH124, AINE 201	5

PROGRAM INFORMATION	
General Goal of the Program	Our Computer Engineering program aims to graduate highly skilled and knowledgeable professionals with hands-on experience who can be

Program Outputs	1. Apply knowledge of Mathematics, Science, and Engineering to solve complex problems in Software Engineering.
	2. Identify, formulate, design, analyze and implement computer system, component, or process to meet desired needs.
	3. Design system components that meet economic, environmental, social, political, ethical, health and safety, and sustainability requirements.
	4. Conduct investigations of complex engineering problems including design of experiments, analysis, and interpretation of data, and
	5. Construct, select and apply appropriate techniques, resources, and modern simulation tools to solve complex software related problems.
	6. Apply contextual knowledge to assess social, health, safety, and cultural issues and endure the consequent responsibilities relevant to
	7. Utilize core engineering knowledge in a global, economic, environmental, and societal context for sustainable development.
	8. Solve professional, legal, and ethical issues pertaining to core engineering and its related fields.
	9. Function effectively as a team member or a leader to accomplish a common goal in a multi-disciplinary team.
	10. Communicate effectively in both verbal and written forms.
	11. Apply knowledge of engineering and management principles to manage projects effectively in diverse environments as a member or
	12. Engage in independent and lifelong learning for continued professional development.

Course Breakdown

Total number and percentage of courses and credits in different categories. Distribution of courses and credits among semesters in the curriculum.

Total			
Courses:	Number	Credit	ECTS
All Courses	49	145	240
University Core Courses	6	14	20
Faculty Core Courses	17	52	85
Area Core Courses	13	43	73
Area Elective Courses	4	12	24
Faculty Elective Courses	4	12	20
University Elective Courses	4	12	16
Summer Training	1	0	2
Courses offered by the department	25	69	129
Courses offered by other department	24	75	111

Courses Per Semester Statistics

	1	2	3	4	5	6	7	8	Average
Number of Courses Per Semester	7	7	6	6	6	6	6	5	6
Number of Credits Per Semester	21	21	20	18	20	17	14	14	18
Number of ECTS Per Semester	30	30	30	30	30	30	30	30	30

COURSE DESCRIPTIONS

Course Descriptions – I: All Area Core and Faculty/School Core courses offered by the department of the program.

Code	Course Title	Credit	Credit	Catego.	Pre-requisite	Teaching Language
ENGR101	Information Technology and Applications	(2, 0, 1)2	2	FC	-	English
Course Content	This course aims to introduce all students to the basic concepts of information technology and to train them in the skills needed to use office productivity tools. Course subjects include; History of Computing, Fundamental Hardware descriptions and functions, Software types and functions, Numbering Systems and Binary, Input, Output and Storage devices, Internet and the World Wide Web, Understanding Networks, Privacy while using Computers, Computer and Software Crimes and Security, Computer Ethics, Cloud Computing fundamentals. The course also covers the usage of Microsoft Word, PowerPoint, and Excel.					
ENGR103	COMPUTER PROGRAMMING-I	(2, 0, 2)3	5	FC	-	English
Course Content	The Computer Programming course introduces students to the concept of programming including designing algorithms and writing pseudo-code to solve engineering-related problems, creating flowcharts to represent the steps of a problem solution, and the basic elements of the Python programming language the implement their solution. The course covers common high-level programming concepts such as Data types, constants and variables, arithmetic and logical operators, decision-making expressions. Fundamental components of Python included in the course are; storing and manipulating input data, design and use of selection structures, repetition structures, various data structures such as lists, dictionaries and sets, functions, and modular design.					
MATH121	CALCULUS-I	(3, 2, 0)4	6	FC	-	English
Course Content	Calculus-I covers differential and integral calculus, with applications in geometry, physics, and engineering. Students will learn to apply calculus concepts to various scientific and engineering applications. Topics include identifying function types, graphing functions, evaluating limits, handling elementary functions (polynomial, trigonometric, logarithmic, exponential, etc.), solving undefined limits, and evaluating derivatives. Derivatives of elementary functions, product, and quotient rules will be covered, along with applications of derivatives. Integration topics include evaluating integrals, defining integrals, and using methods like substitution, integration by parts, and integrating rational functions. The course will also explore the practical applications of integration.					
MATH123	DISCRETE MATHEMATICS	(3, 1, 0)3	5	FC	-	English
Course Content	Discrete mathematics is the first non-calculus course for mathematics, computer science, and engineering majors. This course introduces the mathematical tools and techniques used to study discrete processes as opposed to continuous processes. Topics covered include discrete concepts such as basic set theory, functions, relations, recurrences, counting principles, the fundamentals of propositional logic and Boolean algebra, graphs, and trees. The course also introduces proof techniques in mathematics, including proof by induction, proof by truth table, proof by Venn diagram, etc. This course is indeed a prerequisite for logic design, operational research, combinatorics, abstract algebra, mathematical modeling, geometry, and topology courses.					
PHYS121	PHYSICS-I	(3, 1, 1)4	5	FC	-	English
Course Content	The aim of the course is to provide the basic information in order to help the students to understand the possible complicated problems in engineering. In this regard, the basic principles and methods of solving the problems in physics are taught. The course provides a basic grounding in elementary physics including mechanics. The basic subjects of the course are: Units and dimensions uniformly accelerated motion in one dimension, Freefall, Vector mathematics, Two-dimensional motion, Newton's laws of motion, Applications of Newton's laws, Free body diagrams, Circular Motion, Work and energy, Conservation of energy, Momentum, impulse, and collisions, Rotational kinematics, Torque, Static equilibrium. For completeness, the students are supposed to do 6 experiments related to the subjects of the course.					
ENGR104	COMPUTER PROGRAMMING II	(2, 0, 2)3	4	FC	ENGR103	English
Course Content	Review of the C programming language. Structured and modular programming using C. Local and global variables. Structured programming constructs. Arrays and array handling. Multi-dimensional arrays. Structures and Unions. Arrays of structures. Defining new data types in C. Functions in C. Call-by-value and call-by-reference. Character and string functions. Scope and extent. Recursion. Pointers and pointer arithmetic. Dynamic memory allocation and simple data structures in C. Arrays of pointers. Bit manipulation. Files; data and file processing. Conditional compilation and exception handling in C.					
MATH122	CALCULUS-II	(3, 2, 0)4	6	FC	MATH121	English
Course Content	This calculus course covers differential and integral calculus with applications in geometry, physics, and engineering. Topics include sequences and infinite series, convergence tests, absolute and conditional convergence, power series, Taylor and Maclaurin series, and radius of convergence. It also covers parametric equations and polar coordinates, graphing polar equations, area in polar coordinates, arc length, and derivative of polar equations. Vectors and vector-valued functions, dot and cross products, lines, and planes are explored. Additionally, the course covers functions of several variables, domain, limits, partial derivatives, and definite integrals over regions.					

MATH124	**LINEAR ALGEBRA**	(3, 1, 0)3	5	FC	-	English
Course Content	The aim of this course is to introduce the basic operations in linear algebra and applications in engineering problems; matrices, matrix properties, and matrix operations: Addition, scalar multiplication, multiplication, transpose, solution of system of linear equations: Elimination method, Gauss Jordan forms, inverse method to solve linear systems, row reduced echelon forms, Gaussian elimination method, inverse, and determinants: solving linear equations with determinant (Cramer's rule), use one row to evaluate determinant, minor, cofactor, adjoin matrix, identity matrix, square matrix of the matrices. Real vector spaces, vectors and their properties and applications in engineering: Addition, subtractions, dot product, scalar multiplication, cross product, basis, dimensions, and subspaces.					
PHYS122	**Physics-II**	(3, 1, 1)4	5	FC	PHYS121	English
Course Content	This course provides the basic information to help the students to understand the possible complicated problems in engineering. The subjects of the course are mostly Electricity and Magnetism. The basic subjects of the course are Properties of electric charges, Coulomb's law, and Electric field of continuous charge distribution, Gauss's law, and electric flux. Application of Gauss's law to charged insulators, Obtaining the value of the electric field from the electric potential, Electric potential and the potential energy due to point charges, Electric potential due to continuous charge distributions, Electric current, Resistance and Ohm's law, Electromotive force, Resistors in series and in parallel. Kirchhoff's rules.					
CMPE215	**ALGORITHMS AND DATA STRUCTURES**	(3, 0, 1)3	6	FE	ENGR104	English
Course Content	The objective of this course is to provide the basics of data structures and data organization. The course will introduce C/C++ and algorithms for the implementation of data structures which are stack, queue, linked list, and tree. Also, the applications of data structures cover stack applications which are parenthesis checker, infix to postfix and prefix conversions, recursion, dynamic stack and queue, and tree traversals. Theoretical aspects of the most widely used data structures will be covered during the lectures. Programming assignments and lab works cover the C/C++ implementations of applications of data structures that are discussed in the lectures.					
ELEE211	**DIGITAL LOGIC DESIGN**	(3, 0, 2)4	6	AC	-	English
Course Content	This course presents the basic tools for the design and analysis of digital circuits and provides methods and procedures suitable for a variety of digital design applications in computers, control systems, data communications, etc. The course introduces data representation in binary systems, complements, Boolean algebra, logic gates, truth tables, logic circuits, timing diagrams, De Morgan's law, algebraic manipulation, minterms and maxterms, Sum of Products (SOP) and Product of Sums (POS) forms, Boolean function simplification tools and Karnough Map method, NAND and NOR implementations, don't care conditions, combinational circuit design and analysis procedures, and design of Adders, Subtracters and Code Converters.					
ELEE231	**CIRCUIT THEORY I**	(3, 0, 2)4	6	AC	MATH124,	English
Course Content	The course provides students with fundamental Concepts of Circuit Theory: Current, Voltage, Power and Energy as well as Definitions of Circuit Componentes: Voltage Current Sources; Resistors and Ohm's Law. Computation of Power over a Resistor, Set Up Circuit Model. Kirchhoff's Current and Voltage Laws. Resistors in Series and Parallel Configuration; Voltage and Current-Divider Circuits. Ampermeter, Voltmeter and Ohmmeter Circuits. Wheatstone Bridge, Triangle-Star Transformation. Loop Currents and Node Voltages Techniques, Source Transformation. Linearity and superposition principles, source transformations. Thevenin's and Norton's Theorems, Maximum Power Transfer, Graf Theory. Inductance and capacitance. The natural and forced response of the first – order (RL and RC) circuits. Natural and step responses of second-order RLC circuits.					
MATH225	**DIFFERENTIAL EQUATIONS**	(2, 2, 0)3	5	FC	MATH121,	English
Course Content	In this course, the ordinary differential equations and their applications will be considered. The course will demonstrate the usefulness of ordinary differential equations for modeling physical and engineering problems. Complementary mathematical approaches for their solution will be presented, including analytical methods. The basic content of the course includes first-order ordinary differential equations and their types of exact, separable, Bernoulli, first order, homogeneous ordinary differential equations, linear independence of the solutions, higher-order ordinary differential equations, and their solutions. The undetermined coefficient methods, the variation of the parameter method, Cauchy-Euler equations. The definition of the Laplace transform and some important applications of the Laplace transform will be included in this lecture.					
CMPE216	**OBJECT ORIENTED PROGRAMMING**	(2, 0, 2)3	6	AC	ENGR104	English
Course Content	This course introduces the concepts of object-oriented programming to students with a background in the procedural paradigm. The course begins with a brief review of control structures and data types with emphasis on structured data types and array processing. It then moves on to introduce the object-oriented programming paradigm, focusing on the definition and use of classes along with the fundamentals of object-oriented design. Other topics include an overview of programming language principles, simple analysis of algorithms, basic searching and sorting techniques, memory management, an introduction to software engineering issues, and ethics in software development.					
CMPE232	**OPERATING SYSTEMS**	(3, 0, 0)3	6	AC	ENGR104	English
Course Content	This course is an introduction to the basic concepts of operating systems, with both theoretical and practical issues being considered. Upon completion of the course, the student should understand the fundamental concepts and issues involved in operating system design and know about the basic services provided by operating systems in general. Topics include process description and control, deadlock, process scheduling, threads, SMP, partitioning, paging, segmentation, memory management algorithms, disk scheduling, and file systems. In addition to theory and concepts, specific implementation-related information is covered using the Linux Operating System.					
CMPE252	**ANALYSIS OF ALGORITHMS**	(3, 0, 2)4	6	FE	CMPE215	English
Course Content	The primary goal of this course is to introduce students to algorithm analysis and design in order to improve their analytical thinking skills. The emphasis of the course is on algorithms and problem-solving techniques. Runtime analysis, complexity analysis of sorting and searching algorithms, divide and conquer algorithms, dynamic programming, greedy algorithms, graph algorithms, and string matching algorithms are all important concepts. A variety of problem-solving paradigms will be applied to demonstrate creative and effective approaches to a particular challenge. In each scenario, emphasis will be given to categorically demonstrating the algorithm's soundness. Upon completion, the students will be able to demonstrate how effective the algorithm is in comparison to simple procedures.					
ENGR215	**RESEARCH METHODS FOR ENGINEERING AND ARCHITECTURE**	(2, 0, 0)2	3	FC	-	English
Course Content	The aim of this course is to develop students' knowledge and understanding of the role and conduct of quantitative and qualitative research methods in engineering. The imperative for ethical research practice will be presented. The course equips students with the skills to review and conduct methodologically sound research as a part of their professional work. Students develop the skills to recognize and reflect on the strengths and limitations of different research methodologies, understand the links between theory and practice, critically assess research, and address ethical and practical issues. The course takes a step-by-step approach to the design and implementation of quantitative and qualitative techniques including case study and precedent studies, surveys, interviews, focus groups, participant observation, textual and media analysis.					
STAT226	**PROBABILITY AND STATISTICS**	(3, 1, 0)3	6	FC	MATH121	English
	The objective of this course is to introduce basic probability and statistics concepts. The focus of this course is on both applications and theory. Topics include:					

Course Content	introduction to random variables, simple data analysis and descriptive statistics, frequency distribution, cumulative distribution, sample space, events, counting sample points (basic combinatorics), probability of an event, probability axioms, laws of probability, conditional probability, Bayes' rule, discrete and continuous random variables, probability distributions, cumulative probability distributions, discrete and continuous probability distributions, discrete uniform, Binomial, Geometric, Hypergeometric, Poisson, Continuous uniform, Normal Disributions, Gamma and Exponential distribution, jointly distributed random variables, expectation and covariance of discrete and continuous random variables, random sampling, sampling distributions, distribution of Sample Mean, Central Limit Theorem(CLT).

CMPE321	**MICROPROCESSORS**	(3, 0, 2)4	6	FE	ELEE211	English
Course Content	The Microprocessors course covers the main components and working principles of microprocessors, focusing on the Intel 80x86 family architecture. Topics include memory organization, assembly programming, and debugging. Students will develop programs for arithmetic, BCD, ASCII operations, and perform input/output device programming. They will learn to handle keyboard input, display characters or strings on the screen, and convert data to ASCII, packed BCD, and unpacked BCD formats. The course also explores properties and interfacing of parallel and serial ports, and designing microprocessor-based systems, using the real-world example of the 80x86 IBM PC. By the end of the course, students will have essential skills to work with microprocessors and develop practical applications.					
CMPE341	**DATABASE SYSTEMS**	(3, 0, 2)4	5	FE	CMPE215	English
Course Content	This is a database management system introduction course. The lectures' primary goal is to show students how to conceptually model data and then implement that model in SQL. The focus of the lectures is on practical aspects of data modeling, including normalization and the creation of entity connection diagrams. Oracle is used in the labs to teach SQL. The purpose of lab work is to thoroughly introduce SQL and, in particular, the SQL data manipulation language statement. The learner will be able to create databases for use in industry after completing this course.					
SFWE343	**SOFTWARE ANALYSIS AND DESIGN**	(2, 0, 2)3	5	FE	CMPE216	English
Course Content	The aim of this course is to introduce some fundamental principles of the software engineering discipline and illustrate the application of those principles in the context of a real-life project. Main topics covered are software process models, rapid software development and prototyping, agile software development, Initial design, modularity, structure charts, partitioning using UML, database design, software metrics, risk analysis and management, testing and quality assurance, software estimation techniques, software quality, and configuration management. Upon completion of this course, the students analytical skills will be enhanced. Meanwhile, they will learn how to understand the customer's language and how to explore the customer's goals in context.					
SFWE315	**VISUAL PROGRAMMING**	(2, 0, 2)3	6	FE	CMPE216	English
Course Content	This course introduces computer programming using the Visual Programming Language with object-oriented programming principles. The emphasis is on event-driven programming methods, including creating and manipulating objects and classes and using object-oriented tools such as the class debugger. Visual programming languages are widely used for the rapid development of graphical applications. This subject will introduce students to the fundamental principles of event-driven programming and to programming in a visual environment through the use of the Visual C# programming language. An additional aim of this subject is to give students an understanding of the main ideas of human-computer Interaction (HCI). Upon completion, students should be able to design, code, test, and debug at a beginning level.					
SFWE415	**SOFTWARE ARCHITECTURE**	(3, 0, 1)3	6	FE	SFWE343	English
Course Content	The objective of this course is to generate dependable, safe, and effective software products by focusing on software product development. This involves looking at the general organization of the software's development and release phases, how the software is broken down into components, how the servers are organized, and the technologies that were utilized to create the software. With a focus on the practical concerns inherent in software project management, students will master the fundamentals of software architectural designs, patterns, and views. In addition, a brief introduction to microservices architecture and cloud-based applications will be covered.					
MATH328	**NUMERICAL ANALYSIS**	(3, 1, 0)3	6	FE	MATH124,	English
Course Content	In this course students will learn how to solve mathematical problems numerically, which cannot be solved analytically. The course content will includes following topics: Approximate calculation and error concept, Convergence, stability, error analysis and conditioning. Solving systems of linear equations: The LU and Cholosky factorization, pivoting, error analysis in Gaussian elimination. Matrix eigenvalue problem, power method, orthogonal factorizations and least squares problems. Solutions of nonlinear equations. Bisection, Newton`s, secant and fixed point iteration methods. Approximate root finding methods: sequential repeating method, sloping method, Newton-Raphson method, Bairstow method. Numeric integration methods. Finite differences. Numeric derivatives. Euler method, Taylor method.					
SFWE403	**SUMMER TRAINING**	(0, 0, 0)0	2	AC	-	English
Course Content	Engineering summer training is a 30-day internship for engineering students to apply theoretical knowledge from their Bachelor's studies in a professional setting. The training can take place in any institution related to Software Engineering. Students work on real-life tasks, interact with professionals, and explore their interests within the industry. After the third year of their studies, they write summer training reports summarizing their experiences. A committee evaluates these reports to assess the students' internship performance. The training aims to bridge the gap between academia and industry, enabling students to better prepare for future career opportunities and make informed decisions about their professional path.					
SFWE411	**SOFTWARE VALIDATION & TESTING**	(3, 0, 1)3	6	FE	SFWE343	English
Course Content	The goal of this course is to teach students about software validation and testing concepts and theories. It is primarily concerned with examining whether a software system meets specifications and requirements so that it fulfills its intended purpose. White box, black box, integration, system and acceptance, performance, regression, object-oriented, usability, and accessibility testing will be covered. Students who successfully complete the course will be aware of a wide range of software testing techniques and have the ability to apply the right techniques in the process of software validation and testing.					
ENGR401	**ENGINEERING DESIGN I**	(2, 1, 0)2	6	FC	-	English
Course Content	Engineering Design is a crucial activity for engineering students, involving various phases of the design process. Students work in teams under supervision to complete interdisciplinary capstone projects over one academic year, spanning ENGR401 and ENGR402 courses. ENGR401 covers problem formulation, technical surveys, detailed problem study, analysis, and methodical initial solution formulation. The course requires comprehensive preliminary design documentation for solving a realistic and complex software engineering problem, applying skills gained throughout the undergraduate program. Students present progress through reports and presentations during the semester and at its conclusion. This extended exercise aims to cultivate professional application and experience in engineering design.					

ENGR402	**ENGINEERING DESIGN II**	(0, 4, 2)3	10	FC	ENGR401	English
Course Content	This course is the sequel to ENGR401. It consists of the implementation of a realistic, preferably interdisciplinary, engineering capstone design project emphasizing engineering design principles on an electrical and electronic engineering topic. It is carried out by a team of students under the supervision of an instructor. The team must complete the detailed design and implementation of the preliminary design they started in the ENGR401 course. It is an extended exercise in the professional application of the knowledge, experience and skills gained in the undergraduate program. The team has to complete analysis, design, implementation, testing and documentation of a proto-type or actual engineered product, present it and submit a final report in the technical project report format.					
ENGR404	**ENGINEERING ATTRIBUTES AND ETHICS**	(2, 0, 0)2	3	FC	-	English
Course Content	Engineering Attributes and Ethics is a final year course which aims to provide knowledge and awareness of a number of important engineering issues. The knowledge areas include but are not limited to: professionalism, ethics, project management, sustainable development, risk management, change management, standards, health, environment, hazards, workplace health and security, societal issues as well as contemporary issues reflecting on the applications of the engineering profession. Awareness areas include but are not limited to entrepreneurship, innovation and the legal ramifications of the engineering solutions.					
OHSA206	**OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT**	(3, 0, 0)3	3	FC	-	English
Course Content	This course provides engineering students with a comprehensive understanding of occupational safety and health management principles in various industries. Topics covered include the development of safety and health functions, hazard avoidance concepts, the impact of regulations, handling toxic substances, environmental control, noise, explosive materials, fire protection, personal protection, and first aid. By the end of the course, students will be equipped with the knowledge and skills to create safe working environments, implement safety measures, and effectively manage occupational safety and health concerns in professional settings.					

Course Descriptions – III: All Area Elective and Faculty/School Elective courses offered by the department of the program.

Code	Course Title	Credit	Credit	Catego.	Pre-requisite	Teaching Language
SFWE316	**INTERNET AND WEB PROGRAMMING**	(2, 0 ,2)3	6	AE		English
Course Content	This course is an introduction to programming for the World Wide Web. Students will learn about the relationship between clients and servers, how the internet works, and how web pages are constructed using several technologies. The following topics will be covered: HyperText Markup Language (HTML) for authoring web pages; Cascading Style Sheets (CSS) for applying stylistic information to web pages; JavaScript (JS) for creating interactive web pages; Asynchronous JavaScript and XML (Ajax) for enhanced web interaction and applications; PHP web services for handling and responding to web service requests; and Structured Query Language (SQL) for interacting with databases. After successfully completing this course, a student should be able to Support the development of web pages.					
SFWE434	**CRYPTOGRAPHY**	(3, 0 ,0)3	6	AE		English
Course Content	Introduction to Cryptology, Symmetric Cryptography, Cryptanalysis, Modular Arithmetic and More Historical Ciphers, Stream Ciphers, Random Numbers and an Unbreakable Stream Cipher, Shift Register-Based Stream Ciphers, The Data Encryption Standard (DES) and Alternatives, Overview of the DES Algorithm, Internal Structure of DES, Decryption, Security of DES, Implementation in Software and Hardware, DES Alternatives, The Advanced Encryption Standard (AES), Overview of the AES Algorithm, Some Mathematics: A Brief Introduction to Galois Fields, Internal Structure of AES, Decryption, More About Block Ciphers, Introduction to Public-Key Cryptography, The RSA Cryptosystem.					
SFWE431	**HUMAN COMPUTER INTERACTION**	(3, 0 ,0)3	6	AE		English
Course Content	The goal of this course is to teach students about human-computer interaction concepts and theories. It is primarily concerned with how humans perceive and interact with computers, cognitive principles, design, evaluation, user experience, direct manipulation and immersive environments, fluid navigation, experessive humman and command languages, advancing user experience, timely user experience, documentation and data visualization.					
SFWE412	**SOFTWARE QUALITY ASSURANCE**	(3, 0 ,0)3	6	AE		English
Course Content	Software Quality Assurance (SQA) is a critical aspect of software development that ensures the final product meets the desired standards and specifications. This course will provide students with an understanding of the principles and techniques used in SQA. Software quality assurance issues are discussed in general terms; however, the course concentrates on practical issues related to testing large software packages. Test case design, the testing plan, and test management are issues that are handled in more detail.					
CMPE463	**CLOUD COMPUTING**	(3, 0 ,0)3	6	AE	-	English
Course Content	This course focuses on the use of the most popular cloud computing applications and services that run on a distributed network using virtualized resources and are accessed by common Internet protocols and networking standards. Its architecture, abstraction, virtualization, infrastructure, scaling deployments, machine learning in the cloud, data management, security, and privacy in the cloud will be discussed in detail. On successful completion of this course, students should be able to: Explain Cloud Computing abstraction and virtualization; Describe cloud storage services, pros and cons; Use different cloud storage services; Work with cloud APIs and SDKs; Describe machine learning in the cloud; Secure data in the cloud; and Build their own cloud with open stack.					
CMPE464	**ARTIFICIAL INTELLIGENCE**	(3, 0 ,0)3	6	AE	-	English
Course Content	This course teaches students the fundamentals of artificial intelligence's knowledge representation, problem solving, and learning methodologies. Definitions of AI from many perspectives, intelligent agents and agent architectures, rational intelligent agents, how agents should act, and intelligent agent environments will be taught. Students should be able to: develop intelligent systems by assembling solutions to concrete computational problems; comprehend the role of knowledge representation, problem solving, and learning in intelligent-system engineering; and recognize the role of problem solving, vision, and language in understanding human intelligence from a computational standpoint.					
CMPE465	**NEURAL NETWORKS**	(3, 0 ,0)3	6	AE	-	English
Course Content	This course serves as an introduction to neural networks, covering both theoretical and applied topics. After completing this course, the student should be able to apply neural networks to actual classification issues and comprehend the key neural network structures and learning algorithms. Associative memory networks, discrete hopfield networks, radial basis function networks, and self-organizing networks are some of the subjects discussed. Single-layer perceptions and multi-layer perceptions are also covered. Students who successfully complete this course should be able to: define a neural network; Describe the differences and similarities between rudimentary artificial neural network models and real brains. Describe the key elements that neural network systems should consider to achieve effective learning and generalization performance.					
CMPE474	**INTRODUCTION TO PARALLEL COMPUTING**	(3, 0 ,0)3	6	AE	-	English
	This course focuses on designing effective programs that take advantage of the extraordinary power afforded by modern parallel computers and allow the programs to achieve the highest levels of performance. Parallel computing is widely used. Parallel computing is commonly used to meet speed and efficiency goals					