FINAL INTERNATIONAL UNIVERSITY

FACULTY OF ENGINEERING

COMPUTER 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	MATH121	CALCULUS-I	FC	3	2	0	4		6
1	MATH123	DISCRETE MATHEMATICS	FC	3	1	0	3		5
1	PHYS121	PHYSICS-I	FC	3	1	1	4		5
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	TUOG101 / 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	STAT226	PROBABILITY AND STATISTICS	FC	3	1	0	3	MATH121	6
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	OHSA206	OCCUPATIONAL HEALTH AND SAFETY	FC	3	0	0	3	-	3
		Total 6 courses	**TOTAL:**	**16**	**1**	**4**	**18**		**30**
5	CMPE321	MICROPROCESSORS	AC	3	0	2	4	ELEE211	6
5	CMPE341	DATABASE SYSTEMS	AC	3	0	2	4	CMPE215	5
5	ELEE341	ELECTRONICS-I	AC	3	0	2	4	ELEE231	5
5	SFWE343	SOFTWARE ANALYSIS AND DESIGN	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:**	**11**	**0**	**8**	**21**		**30**
6	MATH328	NUMERICAL ANALYSIS	FC	3	1	0	3	MATH124 / MATH225	6
6	CMPE324	COMPUTER ARCHITECTURE	AC	3	0	0	3	ELEE211	5
6	CMPE322	DATA COMMUNICATION AND COMPUTER NETWORKS	AC	3	0	2	4	CMPE215	5
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:**	**9**	**1**	**2**	**19**		**30**
7	CMPE403	SUMMER TRAINING	AC	0	0	0	0		2
7	ENGR401	ENGINEERING DESIGN-I	FC	1	2	0	2		6
7	CMPE421	PROGRAMMING LANGUAGES	AC	3	0	0	3	CMPE216	6
7	CMPEXX1	AREA ELECTIVE	AE	X	X	X	3		6
7	CMPEXX2	AREA ELECTIVE	AE	X	X	X	3		6
7	UNIEXX4	UNIVERSITY ELECTIVE	UE	X	X	X	3		4
		Total 6 courses	**TOTAL:**	**4**	**2**	**0**	**14**		**30**
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	ENGRXX4	FACULTY ELECTIVE	FE	X	X	X	3		5
8	CMPEXX3	AREA ELECTIVE	AE	X	X	X	3		6
8	CMPEXX4	AREA ELECTIVE	AE	X	X	X	3		6
		Total 5 courses	**TOTAL:**	**2**	**4**	**2**	**14**		30
			GRAND TOTAL:	**93**	**16**	**28**	**148**		**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	CMPE422	REAL-TIME SYSTEMS	AE	3	0	0	3	-	6
2	CMPE431	ADVANCED COMPUTER NETWORKS	AE	3	0	0	3	-	6
3	CMPE432	WIRELESS COMMUNICATION NETWORKS	AE	3	0	0	3	-	6
4	CMPE433	WIRELESS SENSOR NETWORKS	AE	3	0	0	3	-	6
5	CMPE434	INFORMATION AND NETWORK SECURITY	AE	3	0	0	3	-	6
6	CMPE455	MODERN PROGRAMMING PLATFORMS	AE	3	0	0	3	-	6
7	CMPE461	COMPUTING SYSTEMS	AE	3	0	0	3	-	6
8	CMPE462	SERVICE-ORIENTED COMPUTING	AE	3	0	0	3	-	6
9	CMPE463	CLOUD COMPUTING	AE	3	0	0	3	-	6
10	CMPE464	ARTIFICIAL INTELLIGENCE	AE	3	0	0	3	-	6
11	CMPE465	NEURAL NETWORKS	AE	3	0	0	3	-	6
12	CMPE466	EXPERT SYSTEMS	AE	3	0	0	3	-	6

13	CMPE474	INTRODUCTION TO PARALLEL COMPUTING	AE	3	0	0	3	-	6
14	CMPE475	ARTIFICIAL INTELLIGENCE TOOLS	AE	3	0	0	3	CMPE464	6
15	CMPE476	DIGITAL FORENSICS AND INVESTIGATIONS	AE	3	0	0	3	-	6
16	ELEE426	EMBEDDED SYSTEMS	AE	3	0	0	3	-	6
17	CHEM121	CHEMISTRY	FE	2	2	1	3	-	5
18	MATH228	ENGINEERING MATHEMATICS	FE	3	1	0	3	MATH124, MATH122	6
19	ELEE331	SIGNALS AND SYSTEMS	FE	3	0	2	4	-	6
20	ELEE362	COMMUNICATION SYSTEMS	FE	3	0	2	4	-	6
21	ELEE431	DIGITAL SIGNAL PROCESSING	FE	3	0	1	3	-	6
22	SFWE315	VISUAL PROGRAMMING	FE	2	0	2	3	CMPE215	6
23	SFWE316	INTERNET AND WEB PROGRAMMING	FE	2	0	2	3	CMPE216	6
24	SFWE415	SOFTWARE ARCHITECTURE	FE	3	0	1	3	-	6
25	SFWE411	SOFTWARE VALIDATION & TESTING	FE	2	0	2	3	-	6
26	SFWE412	SOFTWARE QUALITY ASSURANCE	FE	3	0	0	3	-	6
27	AINE301	BASIC SEARCH METHODS	FE	3	0	0	3	MATH124, AINE201	5
28	AINE312	DATA SCIENCE	FE	3	0	0	3	ENGR104	5
29	AINE334	KNOWLEDGE REPRESENTATION AND REASONING	FE	3	0	0	3	-	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 outstanding experts.
Program Learning Outcomes	1. Apply advanced mathematics, science, and engineering fundamentals to analyse and solve complex computer engineering problems.
	2. Integrate and evaluate knowledge from current and emerging technologies to identify, formulate, and investigate complex engineering problems through systematic inquiry.
	3. Design and develop innovative engineering solutions, taking into account health, safety, legal, cultural, societal, and environmental sustainability factors.
	4. Select and utilize modern engineering tools, software, and techniques effectively, with an awareness of their applicability and limitations.
	5. Assess and interpret the societal, environmental, and ethical implications of engineering solutions, applying professional judgment in decision-making.
	6. Demonstrate ethical conduct, professional responsibility, and adherence to recognized standards and codes in engineering practice.
	7. Work independently and collaborate effectively in multidisciplinary and multicultural teams, demonstrating leadership and responsibility in achieving shared goals.
	8. Communicate effectively with peers, professionals, and society at large through technical reports, documentation, presentations, and clear instructions.
	9. Plan, manage, and execute engineering projects using sound principles of project management, organization, and leadership in diverse environments.
	10. Engage in autonomous lifelong learning by maintaining coding proficiency, applying advanced research methods, and adapting to technological advancements to ensure continuous professional growth.

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	148	240
University Core Courses	6	14	20
Faculty Core Courses	17	52	85
Area Core Courses	14	46	75
Area Elective Courses	4	12	24
Faculty Elective Courses	4	12	20
University Elective Courses	4	12	16

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	21	19	14	14	19
Number of ECTS Per Semester	30	30	30	30	30	30	30	30	30

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

Course Code	Course Title	Credit	ECTS Credit	Course Categ..	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 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
	Calculus-I covers differential and integral calculus, with applications in geometry, physics, and engineering. Students will learn to apply calculus concepts to various scientific					

Course Content	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**	(2, 1, 2)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	AC	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.					
ELEEE211	**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, PHYS122	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**	(3, 2, 0)4	5	FC	MATH121, MATH124	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	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					

Course Content	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	AC	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
Course Content	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: 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	AC	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	AC	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.					
ELEE341	**ELECTRONICS I**	(3, 0, 2)4	5	AC	ELEE231	English
Course Content	Operational amplifiers: common mode and difference mode process. Op-amp applications: voltage adder, voltage follower, differential amplifier, derivate and integrator circuits, active filter design. Semiconductor elements and diodes. Diode equivalent circuits. LEDs and zener diodes. Load line analysis. Half-wave and full-wave rectifier circuits. Bipolar junction transistor: Operation limits of transistors, testing and electrical specifications. DC biasing of transistors: Determining of operation point, voltage divider biasing, voltage feedback biasing and other biasing types. Transistor switching circuits. PNP transistors and stability of biasing. Characteristic of field effect transistors. Depletion-type MOSFETs, Enhancement-type MOSFETs, VMOS and CMOSs. Biasing of field effect transistors. Self-biasing and voltage divider biasing. Biasing of depletion-type MOSFETs and enhancement-type MOSFETs. Other two gates: Varactor, power diodes, tunnel diode, photodiode.					
SFWE343	**SOFTWARE ANALYSIS AND DESIGN**	(2, 0, 2)3	5	AC	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.					
CMPE322	**DATA COMMUNICATION AND COMPUTER NETWORKS**	(3, 0, 2)4	6	AC	CMPE215	English
Course Content	This course will cover the principals of data communications; information transfer, computer networks and their applications. Network structures, architectures and protocols. Openb systems and the ISO-OSI reference model; services and network standardization. Communcation systems: transmission media, analog and digital transmission, PSTN, modems, PCM, encoding and digital interface. Thransmission and switching: FDM, TDM, modulation, circuit, packet and message switching. The store and forward concept. Networking characteristics. Storage, delay multiplexing, bandwidth sharing and dynamic bandwidth management, QoS. Channel organization, framing, channel access control. PSPDN and integrated digital network concept: ISDN. LANs, MANs and WANs. ATM and gigabit networking. Communication models. De-facto standards. The Internet open architecture and the protocol suite. Moden applications of networking.					
CMPE324	**COMPUTER ARCHITECTURE**	(3, 0, 0)3	6	AC	ELEE211	English
Course Content	The fundamentals of computer architecture are covered in this course. The course offers a study of the internal workings, internal components, memory organization, and system organization of contemporary computer systems. It also provides a basic background on the development of the computer, its design process, and its internal workings. From an architectural standpoint, all internal computer parts—including processors, cache memories, random access memories, magnetic disks, optical memories, and input and output connections—are taken into account. The arithmetic logic unit's (ALU) integer and floating point representations with arithmetic operations are explained. Also discussed are the fundamentals of operating systems.					
MATH328	**NUMERICAL ANALYSIS**	(3, 1, 0)3	6	FC	MATH124, MATH225	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.					
CMPE403	**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 Computer 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.					

CMPE421	PROGRAMMING LANGUAGES	(3, 0, 0)3	6	AC	CMPE216	English
Course Content	Explore syntax, analysis, and semantics; names, bindings, and scopes. Understand data representation and types, expressions, and assignment statements. Learn about statement-level control structures, evaluation sequence at expression, statement, and subprogram levels. Delve into concurrency, exception handling, memory management, and implementation issues in object-oriented programming. Study principles like abstraction, inheritance, and polymorphism. Discover unique aspects of logic and functional programming languages, and sample other paradigms such as scripting and high-performance computing. Analyze the evolution and paradigms of programming languages and examine their applications in modern software development.					
ENGR401	ENGINEERING DESIGN I	(1, 2, 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 computer 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, 2)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.

Course Code	Course Title	Credit	ECTS Credit	Course Categ..	Pre-requisite	Teaching Language
CMPE422	REAL TIME SYSTEMS	(3, 0 ,0)3	6	AE	-	English
Course Content	The purpose of the course is to introduce students to the main principles, ideas, and resources of real-time system design. Real-time systems introduction, ADA programming, real-time system architecture and design, concurrent programming and synchronization, real-time scheduling, dependability and exception handling, real-time operating systems, and distributed real-time systems are just a few of the topics covered. The student is required to master the concepts of a process and thread, their states, contexts, and transitions between states upon successful completion of the course. Additionally, the students would be able to apply protocols for priority inheritance, original, and instantaneous to solve the priority inversion problem.					
CMPE431	ADVANCED COMPUTER NETWORKS	(3, 0 ,0)3	6	AE	-	English
Course Content	This course focuses on advanced topics in the most cutting-edge wired networking technology, with a focus on networking applications and an introduction to the most recent research fields. Give a thorough introduction to a variety of subjects in the study of computer networks, such as the Internet. The most significant protocols now in use are used to illustrate how networks actually function, as opposed to describing how networks operate in abstract protocols. Network protocols, Internet routing, peer-to-peer networks, network security, traffic control, error detection and correction, and internetworking are among the subjects covered. This enables the conversation to include real-world experiences.					
CMPE432	WIRELESS COMMUNICATION NETWORKS	(3, 0 ,0)3	6	AE	-	English
Course Content	This course is an introduction to the design, analysis, and fundamental limits of wireless transmission systems. Topics to be covered include wireless channel and system models; fading and diversity; resource management and power control; multiple-antenna and MIMO systems; space-time codes and decoding algorithms; multiple-access techniques and multiuser detection; broadcast codes and precoding; cellular and ad-hoc network topologies; OFDM and ultra-wideband systems; and architectural issues. Radio propagation effects, coverage and statistical channel modeling, time-varying channels, fading effects, various bandpass modulation schemes and detection systems, channel capacity, spread spectrum communications, diversity, and combining in cellular systems.					
CMPE433	WIRELESS SENSOR NETWORKS	(3, 0 ,0)3	6	AE	-	English
Course Content	This course offers an introduction to Wireless Sensor Networks (WSN) while exploring the latest topics in the field. The primary goal is to provide an overview of fundamental WSN problems and examine existing solutions. Topics covered include data aggregation, information dissemination, security, power management, localization, topology control, routing, naming, and collaborative signal and information processing for target tracking. Students will work on labs involving Ubiquitous Computing applications, implementing them on Micaz motes with Tinyos, a lightweight event-driven operating system. The course will draw heavily from recent research work in wireless sensor networks, allowing students to gain insights into cutting-edge developments in this rapidly evolving domain.					
CMPE434	INFORMATION AND NETWORK SECURITY	(3, 0 ,0)3	6	AE	-	English
Course Content	This course is tailored to cater to the specific requirements of information systems students. It offers a wellrounded approach that delves into all facets of information security, going beyond mere technical controls. The curriculum provides an in-depth exploration of crucial terminology and equips students with the necessary skills to effectively manage information security programs. A newly introduced module focuses on incident response and detection strategies, enhancing students' ability to handle security breaches efficiently. Furthermore, the course covers up-to-date topics such as security operations best practices, legislative considerations, utilization of information management toolsets, principles of digital forensics, and the latest policies and guidelines aligned with both federal and international standards. Through this course, students gain a comprehensive understanding of information security management tailored to meet the demands of modern information systems environments.					
CMPE455	MODERN PROGRAMMING PLATFORMS	(3, 0 ,0)3	6	AE	-	English
Course Content	Modern Programming Platforms provides an in-depth exploration of contemporary software development frameworks and tools used in the industry. The course covers key concepts such as object-oriented and event-driven programming, graphical user interfaces (GUIs), multithreading, exception handling, file management, and database integration. Students will gain hands-on experience with modern programming platforms, libraries, and frameworks, enabling them to build scalable and efficient applications. Emphasis is placed on emerging technologies, industry best practices, and the evolving landscape of software development.					
CMPE461	COMPUTING SYSTEMS	(3, 0 ,0)3	6	AE	-	English
Course Content	This course explores modern computer systems, focusing on abstraction layers and communication mechanisms. The top layer is the operating system, which ensures smooth and safe operation of applications. The next part explores network communication, data transportation, and circuits underlying computer systems. The final part focuses on the physical underpinnings of computers, including transistors processing information. While the course focuses on digital computer systems, students can also study analog or biological computing systems if they align with the course's learning goals.					

CMPE462	SERVICE-ORIENTED COMPUTING	(3, 0 ,0)3	6	AE	-	English
Course Content	This course explores web application architectures with a focus on decentralization and service semantics. It takes into account sophisticated methods for service description, discovery, and interaction (Web service concepts, ideas, and techniques). The subjects covered are semantics, agents, rules, communication protocols, business processes, contracts, and compliance. Students who successfully complete this course will be able to achieve the following things: Create and introduce mobile web services; Employ mobile web services made available by others in their own programs; Create specifications for online services in the Resource Description Framework (RDF) and Online Ontology Language (OWL) by conceptually modeling them; Recognize and use organizational modeling and communication concepts to implement decentralized service-oriented systems.					
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.					
CMPE466	EXPERT SYSTEMS	(3, 0 ,0)3	6	AE	-	English
Course Content	This course introduces intelligent agent principles, searching, knowledge and reasoning, planning, learning, and expert systems. Students will discover how theory and application complement each other in this course. Theory and application are both presented. Students will be introduced to problem-oriented languages, which they can use to create their own expert systems. Students will obtain an understanding of the role of expert systems in today's society by merging theory with a fully functional way of applying that theory to real-world problems.					
CMPE474	INTRODUCTION TO PARALLEL COMPUTING	(3, 0 ,0)3	6	AE	-	English
Course Content	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 in everything from embedded devices and laptops to high-end supercomputers and large-scale data centers. Multi-core processors, as well as clusters and supercomputers built from them, are examples of parallel computers. The course focuses more on how to use these programming systems to achieve and increase high performance than on the mechanics of these systems. In addition, the course presents an appropriate analytical framework for understanding performance, such as performance models, scalability analysis, and iso-efficiency.					
CMPE475	ARTIFICIAL INTELLIGENCE TOOLS	(3, 0 ,0)3	6	AE	CMPE464	English
Course Content	This course provides a comprehensive introduction to MLflow, a powerful open-source platform for managing machine learning workflows. Students will learn how to install and configure MLflow, track and compare experiments, register models, and manage artifacts efficiently. The course covers essential concepts such as creating MLflow projects for reproducibility, utilizing the MLflow model registry for streamlined model versioning, and integrating MLflow with various machine learning frameworks. Additionally, students will explore how to reference artifacts through the API, ensuring seamless collaboration and deployment. Emphasis is placed on best practices for experiment tracking, model lifecycle management, and real-world applications of MLflow in scalable machine learning systems.					
CMPE476	DIGITAL FORENSICS AND INVESTIGATIONS	(3, 0 ,0)3	6	AE	-	English
Course Content	This course offers a comprehensive exploration of digital forensics, focusing on the use of industry-standard tools to address legal and technological challenges in civil and criminal matters. Students will gain expertise in managing digital forensics operations within modern business environments while learning to investigate mobile devices, emails, and computer history. The course also covers data acquisition, processing crime scenes, and writing detailed reports for high-tech investigations. Key topics include virtual machine and cloud forensics, along with the ethical responsibilities of investigators and expert witnesses. Upon completion, students will be prepared to conduct professional and ethical forensic investigations with confidence and precision.					
ELEE426	EMBEDDED SYSTEMS	(3, 0 ,0)3	6	AE	-	English
Course Content	This course introduces the principles of embedded systems, including application areas, design characteristics, and engineering challenges. It covers requirement specification and system modeling using automata, state charts, and dataflow methods. Topics include high-end embedded hardware, secure systems, analog and digital interfaces, and embedded operating systems such as RTOS and virtual machines. The course also addresses IoT system design, performance and energy evaluation, simulation, prototyping, and emulation. Testing strategies, test pattern generation, and design-for-testability techniques are emphasized to ensure system reliability.					

Course Descriptions – IV: All Faculty Elective and Faculty/School Elective courses offered by other academic units.

Course Code	Course Title	Credit	ECTS Credit	Course Categ..	Pre-requisite	Teaching Language
CHEM121	CHEMISTRY	(2, 2, 1)3	5	FE	-	English
Course Content	In this course, students will learn types of matter, measurements, properties of substances; atoms and atomic theory, components of the atom, introduction to the periodic table, molecules and ions, formulas of ionic compounds, names of ionic compounds; atomic masses, the mole, mass relations in chemical formulas, mass relations in reactions; measurements on gases, the ideal gas law, gas law calculations, psychometric of gaseous reactions, gas mixtures: Partial pressures and atomic spectra, the hydrogen atom, quantum numbers, atomic orbitals; shape and sizes; electron configurations in atoms, orbital diagrams of atoms; the polarity of molecules; principles of heat flow, measurements of heat flow, calorimetry, enthalpy, thermochemical equations, enthalpies of formation, the first law of thermodynamics, liquids and solids.					
MATH228	ENGINEERING MATHEMATICS	(3, 1, 0)3	6	FE	MATH122, MATH124	English
Course Content	Engineering Mathematics gives students an introduction to the theory of functions of a complex variable, a fundamental area of mathematics. Topics include complex numbers and their properties, algebra of complex numbers. polar representation. complex functions. limits and continuity. analyticity and analytic functions. analytic functions and the Cauchy-Riemann equations, the logarithm and other elementary functions of a complex variable, integration of complex functions, the Cauchy integral theorem and its consequences, power series representation of analytic functions, the residue theorem and applications to definite integrals.					
ELEE331	SIGNALS AND SYSTEMS	(3, 0, 2)4	5	FE	-	English
Course Content	Classification of Signals and Basic Signal Properties. Time Domain Models of Linear Time Invariant (LTI) Systems: Continuous time systems. Causal LTI systems described by differential equations. System block diagrams. The solutions of differential equations. The unit impulse response and convolution integral. State variable analysis of LTI systems. Discrete time systems. The unit sample response and discrete convolution. Fourier series and Fourier transform representation of continuous-time and discrete- time periodic signals. Time and frequency characterization of signals and systems. Z-transform and inverse z-transform. Region of convergence of the z-transform. z-domain analysis of					

	discrete LTI systems. LTI Systems With Random Inputs. Definition of Random variables, stochastic process, first and second order statistics, moment, correlation and co-variance, stationary process, ergodicity.					
ELEE362	**COMMUNICATION SYSTEMS**	(3, 0, 0)3	5	FE	ELEE331	English
Course Content	Review of Fourier transform and its properties. Transmission of signals through linear systems. Power spectral density and autocorrelation function. The sampling theorem and the Nyquist rate, aliasing distortion. Non-ideal sampling: Pulse amplitude modulation (PAM) and flat-top PAM and equalization. Digital signaling: quantization, encoding and pulse code modulation (PCM), line codes and their spectra, regenerative repeaters. Pulse transmission: Intersymbol interference (ISI), Nyquist method for zero ISI, time division multiplexing (TDM), pulse-time modulation techniques. Complex envelope representation of bandpass and modulated signals. RF circuits: limiters, converters, multipliers, detectors, PLL circuits and etc. Analog modulation techniques: AM, DSB-SC, SSB etc. Binary modulation techniques: ASK, BPSK, FSK.					
ELEE431	**DIGITAL SIGNAL PROCESSING**	(3, 0, 0)3	6	FE	ELEE331	English
Course Content	This course includes frequency-domain representation of the discrete-time signal, Fourier Transform and its properties, Evaluation of the Z-Transform, Properties of ROC for the Z-Transform, Properties of the Z-Transform, Frequency and Time Domain, Representation of Sampling Reconstruction of Band-limited Signals, Nyquist Theory, Aliasing Decimation, Interpolation, Transform analysis of LTI system, Stability, Causality, Inverse systems, Minimum Phase, maximum phase, mixed-phase systems, all pass systems, Relationship between magnitude and phase, Digital Filter Design, Finite Impulse Response (FIR) Filters, Infinite Impulse Response (IIR) Filters and Filters Designs.					
SFWE315	**VISUAL PROGRAMMING**	(2, 0, 2)3	5	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.					
SFWE316	**INTERNET AND WEB PROGRAMMING**	(2, 0, 2)3	6	FE	CMPE216	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.					
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.					
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.					
SFWE412	**SOFTWAREQUALITY ASSURANCE**	(3, 0, 0)3	6	FE		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.					
AINE301	**BASIC SEARCH METHODS**	(3, 0, 0)3	5	FE	MATH124, AINE201	English
Course Content	Basic Search Methods equips students with essential algorithms pivotal for artificial intelligence proficiency. The course covers a range of fundamental search strategies: Informed Search algorithms like A* use heuristic functions to guide search efficiently towards the goal. Heuristics provide approximate solutions and Admissible Heuristics ensure these are never overestimated. Local Search methods like Hill Climbing iteratively improve solutions by making small changes. Metaheuristics such as Genetic Algorithms optimize complex problems inspired by biological evolution processes. Evolutionary Algorithms use principles from genetics and selection to iteratively improve solutions.					
AINE312	**DATA SCIENCE**	(3, 0, 0)3	5	FE	ENGR104	English
Course Content	Data Science introduces the fundamental processes and lifecycle of data science. It covers the reading, representation, manipulation, and storage of complex datasets. Emphasis is placed on Data Exploration and wrangling techniques, including cleaning and imputing missing data. The course addresses Data Visualization methods for effective communication of insights. It distinguishes between Supervised and Unsupervised Learning approaches, exploring classification and regression techniques. Students learn to evaluate model performance and assess the degree of fit. Dimensionality reduction methods such as Principal Component Analysis are introduced, along with attribute selection using forward and backward selection methods.					
AINE334	**KNOWLEDGE REPRESENTATION AND REASONING**	(3, 0, 0)3	5	FE		English
Course Content	Knowledge Representation & Reasoning provides both theoretical foundations and practical skills in representing and reasoning with knowledge. It covers essential topics such as propositional and first-order predicate logic for structured knowledge representation. The course explores Resolution and Description Logics as formal languages for expressing knowledge. Students learn various reasoning techniques including forward and backward chaining in rule-based systems. Additionally, the curriculum includes studying Frames, Ontologies, and Semantic Nets as organizational structures for knowledge. The course concludes with an exploration of Uncertainty and Probabilistic Reasoning in decision-making contexts.					