FINAL INTERNATIONAL UNIVERSITY

FACULTY OF ENGINEERING

ELECTRICAL AND ELECTRONIC 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	CHEM121	CHEMISTRY	FC	2	2	1	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:**	**17**	**5**	**5**	**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		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	ELEE241	SEMICONDUCTOR DEVICES	AC	3	0	0	3	CHEM121	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**	**4**	**20**		**30**
4	ELEE232	CIRCUIT THEORY-II	AC	3	0	2	4	ELEE231	6
4	CMPE216	OBJECT ORIENTED PROGRAMMING	AC	2	0	2	3	ENGR104	6
4	STAT226	PROBABILITY AND STATISTICS	FC	3	1	0	3	MATH121	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
4	MATH228	ENGINEERING MATHEMATICS	FC	3	1	0	3	MATH124, MATH122	6
		Total 6 courses	**TOTAL:**	**16**	**2**	**4**	**18**		**30**
5	ELEE331	SIGNALS AND SYSTEMS	AC	3	0	2	4	-	5
5	ELEE341	ELECTRONICS-I	AC	3	0	2	4	ELEE231	5
5	ELEE351	ELECTROMAGNETICS-I	AC	4	0	0	4	MATH122, PHYS122	6
5	ENGRXX1	FACULTY ELECTIVE	FE	X	X	X	3	-	5
5	ENGRXX2	FACULTY ELECTIVE	FE	X	X	X	3	-	5
5	UNIEXX2	UNIVERSITY ELECTIVE	UE	X	X	X	3	-	4
		Total 6 courses	**TOTAL:**	**10**	**0**	**4**	**21**		**30**
6	ELEE332	CONTROL SYSTEMS	AC	3	0	0	3	ELEE331	5
6	ELEE342	ELECTRONICS-II	AC	3	0	2	4	ELEE341	5
6	ELEE352	ELECTROMAGNETICS-II	AC	3	0	0	3	ELEE351	6
6	ELEE362	COMMUNICATION SYSTEMS	AC	3	0	0	3	ELEE331	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:**	**12**	**0**	**2**	**19**		**30**
7	ELEE403	SUMMER TRAINING	AC	0	0	0	0	-	2
7	ELEE431	DIGITAL SIGNAL PROCESSING	AC	3	0	0	3	ELEE331	6
7	ENGR401	ENGINEERING DESIGN-I	FC	1	2	0	2	-	6
7	ELEEXX1	AREA ELECTIVE	AE	X	X	X	3	-	6
7	ELEEXX2	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	ELEEXX3	AREA ELECTIVE	AE	X	X	X	3	-	6
8	ELEEXX4	AREA ELECTIVE	AE	X	X	X	3	-	6
8	ENGRXX4	FACULTY ELECTIVE	FE	X	X	X	3	-	5
		Total 5 courses	**TOTAL:**	**2**	**4**	**2**	**14**		**30**
			GRAND TOTAL:	**94**	**17**	**24**	**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	ELEE426	EMBEDDED SYSTEMS	AE	3	0	0	3	-	6
2	ELEE434	DIGITAL CONTROL SYSTEMS	AE	3	0	0	3	-	6
3	ELEE435	INTRODUCTION TO ROBOTICS	AE	3	0	0	3	-	6
4	ELEE442	POWER ELECTRONICS	AE	3	0	0	3	-	6
5	ELEE451	MICROWAVE THEORY	AE	3	0	0	3	-	6
6	ELEE461	COMMUNICATIONS SYSTEMS II	AE	3	0	0	3	-	6
7	ELEE464	WIRELESS SENSOR NETWORKS	AE	3	0	0	3	-	6
8	ELEE462	WIRELESS COMMUNICATIONS	AE	3	0	0	3	-	6
9	ELEE463	INFORMATION THEORY	AE	3	0	0	3	-	6
10	ELEE471	HIGH VOLTAGE TECHNIQUES	AE	3	0	0	3	-	6
11	ELEE474	DIGITAL IMAGE PROCESSING	AE	3	0	0	3	-	6
12	AINE332	DEEP NEURAL NETWORKS	AE	3	0	0	3	ENGR104, STAT226	6
13	CMPE431	ADVANCED COMPUTER NETWORKS	AE	3	0	0	3	-	6
14	SFWE422	INTRODUCTION TO MOBILE APPS DEVELOPMENT	AE	3	0	0	3	-	6
15	CMPE434	INFORMATION AND NETWORK SECURITY	AE	3	0	0	3	-	6
16	AINE201	FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE	AE	3	0	0	3	-	6
17	AINE301	BASIC SEARCH METHODS	FE	3	0	0	3	MATH124, AINE201	5
18	CVLE102	ENGINEERING DRAWING	FE	2	0	2	3	-	5

19	MATH328	NUMERICAL ANALYSIS	FE	3	1	0	3	MATH124, MATH225	6
20	CMPE321	MICROPROCESSORS	FE	3	0	2	4	ELEE211	6
21	CMPE322	DATA COMMUNICATION AND COMPUTER NETWORKS	FE	3	0	2	4	CMPE215	5
22	CMPE215	ALGORITHMS AND DATA STRUCTURES	FE	3	0	1	3	ENGR104	6
23	CMPE252	ANALYSIS OF ALGORITHMS	FE	3	0	2	4	CMPE215	6
24	SFWE343	SOFTWARE ANALYSIS AND DESIGN	FE	2	0	2	3	CMPE216	5
25	CMPE341	DATABASE SYSTEMS	FE	3	0	2	4	CMPE215	5
26	SFWE315	VISUAL PROGRAMMING	FE	2	0	2	3	CMPE216	5
27	SFWE316	INTERNET AND WEB PROGRAMMING	FE	3	0	0	3	CMPE216	6
28	SFWE415	SOFTWARE ARCHITECTURE	FE	3	0	1	3	SFWE343	6
29	SFWE411	SOFTWARE VALIDATION & TESTING	FE	3	0	1	3	SFWE343	6
30	AINE312	DATA SCIENCE	FE	3	0	0	3	ENGR104	5
31	CMPE455	MODERN PROGRAMMING PLATFORMS	FE	3	0	0	3	-	6
32	AINE334	KNOWLEDGE REPRESENTATION AND RESEALING	FE	3	0	0	3	-	5

PROGRAM INFORMATION	
General Goal of the Program	Our Electrical and Electronic Engineering program aims to graduate highly skilled and knowledgeable professionals with hands-on experience who can be outstanding experts.
Program Outputs	1. Apply knowledge of Mathematics, Science, and Engineering to solve complex problems in Electrical and Electronic Engineering.
	2. Identify, formulate, design, analyze and implement an electrical or electronic 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 synthesis of the information to provide valid conclusions.
	5. Construct, select and apply appropriate techniques, resources, and modern simulation tools to solve complex electrical and electronics circuits.
	6. Apply contextual knowledge to assess social, health, safety, and cultural issues and endure the consequent responsibilities relevant to professional engineering practice.
	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 leader of a team.
	12. Engage in independent and lifelong learning for continued professional development.

STATISTICS

	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	13	46	73
Area Elective Courses	4	12	24
Faculty Elective Courses	4	12	20
University Elective Courses	4	12	16
Summer Courses	1	0	2
Courses Offered By The Administering Department			
Courses Offered By Other Departments			

PER SEMESTER STATISTICS

	Semester								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Average**
Number of Courses Per Semester	7	7	6	6	6	6	6	5	6.13
Number of Credits Per Semester	21	21	20	18	21	19	14	14	18.50
ECTS Credits Per Semester	30	30	30	30	30	30	30	30	30.00

COURSE DESCRIPTIONS

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 Catego.	Pre-requisite	Teaching Language
CHEM121	CHEMISTRY	(2, 2, 1)3	5	FC	-	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.					
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.					
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.					
ENGR101	**INFORMATION TECHNONOLGY 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.					
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.					
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.					

MATH225	**DIFFERENTIAL EQUATIONS**	(4, 0, 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.					
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.					
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.					
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.					
ISTA226	**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).					
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.					
MATH228	**ENGINEERING MATHEMATICS**	(3, 1, 0)3	6	FC	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.					
ELEE232	**CIRCUIT THEORY II**	3, 0, 2)4	6	AC	ELEE231	English

Course Content	Impedance, admittance, and Kirchhoff"s laws in the frequency domain. Sinusoidal steady state analysis using the nodal and mesh techniques. Sinusoidal steady state analysis using source transformation and superposition. Thevenin and Norton Equivalents in the frequency domain. Instantaneous power, average power, and RMS value. Maximum average power transfer. Apparent power, power factor, and complex power. Power factor correction. Balanced Three-Phase voltages. Balanced Three-Phase connections: Y-Y, Y-Delta, Delta-Delta. Power in three-phase systems. Mutual inductance and energy in a coupled circuit. Linear transformers. Ideal transformers. Transfer function, the decibel scale, and Bode plots. Series and parallel resonance. Passive filters Active filters, are properties of the Laplace transform. Application of the Laplace transform. Application to integrodifferential equations and network stability.					
ELEE241	**SEMICONDUCTOR DEVICES**	(3, 0, 0)3	6	AC	CHEM121	English
Course Content	This course addresses electronic devices on a fundamental level. Topics include semiconductor materials. It provides a broad background for advanced courses in electronics, photonics, and integrated circuit design. Crystal structures, energy levels in crystals. Electronic transport in metals; superconductivity. Semiconductors; impurities; carrier transport in semiconductors; generation and recombination of minority carriers. The P-N junction diode and Schottky diode; diode characteristics and circuits. The bipolar junction transistor (BJT); current flow in diodes, BJTs, and MOSFETs. Integrated circuits. Inverters. TTL, MOS, ECL structures. Logic Gates. Flip-flops. Bistable, astable and monostable multivibrators.					
ELEE331	**SIGNALS AND SYSTEMS**	(3, 0, 2)4	5	AC	-	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.					
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.					
ELEE351	**ELECTROMAGNETICS I**	(4, 0, 0)4	6	AC	MATH122, PHYS122	English

Course Content	Review of vector calculus. Electrostatics in vacuum. Coulomb's and Gauss's laws. Electrostatic potential. Poisson's and Laplace's equations. Conductors in the presence of electrostatic fields. Method of images. Dielectrics; polarization. Dielectric boundary conditions. Capacitance. Electrostatic energy. Electrostatic forces by the virtual work principle. Steady currents. Ohm's and Joule's laws. Resistance calculations. Magnetostatics in vacuum. Ampere's force law. Biot-Savart law. Magnetic vector potential. Ampere's circuital law. Magnetic boundary conditions. Magnetic dipole. Magnetization. Hysteresis curve. Self and mutual inductance. Magnetic stored energy. Magnetic forces by the virtual work principle.					
ELEE332	**CONTROL SYSTEMS**	(3, 0, 0)3	5	AC	ELEE331	English
Course Content	Concepts of modeling, and analysis of electromechanical systems in time and frequency domains, feedback and feed-forward controllers, stability criteria, and design of controllers. Physical systems and the concept of control systems, mathematical background, mathematical modeling of physical systems, transfer functions, block diagrams, signal flow graphs, state variables and state-space modeling, simulation diagrams and computer simulation of the systems, test signals and transient responses of first and the second order systems. Design in time and frequency domains. Root locus analysis and design, Stability of control systems. The concept of Routh-Hurwitz stability, Nyquist stability criterion, and Bode plots. PID controllers: analysis and design. Optimal control systems, intelligent control, introduction to digital control systems. Computer-based simulations and applications related to all topics.					
ELEE342	**ELECTRONICS II**	(3, 0, 2)4	5	AC	ELEE341	English
Course Content	Junction field-effect transistors (JFETs): physical structure and modes of operation, input and output parameters and characteristics. JFET biasing configurations, fixed bias, self-bias, Small-signal analysis of JET amplifiers Frequency response of BJT amplifiers, high-frequency BJT model, Miller's theorem. High frequency response of commonemitter amplifier, bandwidth estimation, bode plots. High frequency response of JFET amplifiers, JFET model at high frequency, high frequency response of BJT amplifiers. Broadband amplifier design, single-stage broadbanding techniques, gainbandwidth product, base compensation. Cascade amplifiers. Multistage amplifiers. BJT differential amplifier, differential and common-mode gains, biasing, current mirror Feedback amplifiers, the general feedback structure, properties of negative feedback: The four basic feedback topologies, determining the loop gain, stability problem.					
ELEE352	**ELECTROMAGNETICS II**	(3, 0, 0)3	6	AC	ELEC351	English
Course Content	Electromagnetic induction; Faraday's and Lenz's laws; transformer and motional electromotive force; induction heating; displacement current; time-varying fields; Maxwell's equations; wave equations; time-harmonic fields; complex phasors; scalar and vector potential functions; plane waves in vacuum; plane waves in dielectrics and conductors; polarization; skin effect; electromagnetic energy and power; Poynting's theorem; reflection and refraction of plane waves at dielectric interfaces; Snell's laws; Fresnel formulas; critical angle; total internal reflection; total transmission; Brewster's angle; standing waves; transmission line theory; TEM waves; transmission line parameters; lossy and lossless lines; matching of transmission lines to their loads.					
ELEE362	**COMMUNICATION SYSTEMS**	(3, 0, 0)3	5	AC	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.					
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.					
ENGR403	**SUMMER TRAINING**	(0, 0, 0)0	2	FC	-	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 Electrical and Electronic 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.					
ELEE431	**DIGITAL SIGNAL PROCESSING**	(3, 0, 0)3	6	AC	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.					
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.					

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 Catego.**	**Pre-requisite**	**Teaching Language**
ELEE426	**EMBEDDED SYSTEMS**	(3, 0 ,0)3	6	AE	-	English
Course Content	This course covers embedded system organization, real-time systems, and system on programmable-chip (SoPC) technologies. Students will gain advanced knowledge in embedded computer design, real-time operating systems, and software development for embedded systems, focusing on ARM Cortex M3 as a representative embedded processor. They will learn hardware-software code sign, real-time scheduling techniques, and embedded system co-specification and partitioning using SystemC or other languages (e.g., UML, C). The course introduces Altera Quartus II and SOPC Builder as tools for embedded hardware- software design and development. By the end of the course, students will be equipped with the principles of embedded system design and have hands-on experience in developing embedded software.					
ELEE434	**DIGITAL CONTROL SYSTEMS**	(3, 0 ,0)3	6	AE	-	English
Course Content	This course introduces digital control and discrete transform (z-transform). Introduction to sampled data and discrete modeling of systems. Discrete and hybrid Signal Flow Graphs (SFG)s. Students will learn designing controllers and applying compensation techniques both in s and z domains. The topics are: Review Of The Root Locus Method. Controller Design in S-Domain. Frequency Response Methods. Implementation of a Control Law on a Microprocessor. Sampling and Reconstruction. Digital Design: Introduction to Z- Transform. Open Loop and Closed Loop Discrete Time Systems. The S - Z Plane Mapping, Second Order Desired Response Z- Plane Root Locus. Controller Design in Z - Plane, PI Controllers. Controller Design in Z - Plane, Pole-Zero Compensation and PID Controllers.					
ELEE435	**INTRODUCTION TO ROBOTICS**	(3, 0 ,0)3	6	AE	-	English
Course Content	This course introduces fundamentals of robot control. Brief review about robots, hardware and robot problems will be explained to give a general idea about the use of robotics. Various types of basic sensors are also be discussed under the issue of robot hardware. Agent function design will be taught to gain robot control algorithm development and design. Robot control programming with mostly used controllers and related programming language concepts will also be covered to improve hardware programming skills of participants of this course. Lectures give the background to the extensive hands-on practical work using the laboratories A practical project will be performed to have an experience about to control a real robot with microcontroller.					
ELEE442	**POWER ELECTRONICS**	(3, 0 ,0)3	6	AE	-	English
Course Content	Introduction to power electronics, types of power electronic circuits. Single phase half wave rectifiers. Single phase full wave rectifiers with resistive and inductive load. Thyristor characteristics; turn on, turn off behaviors and types. Single-phase controlled rectifier with resistive and inductive load. Freewheeling diodes, single phase full converters with resistive and inductive load. Single phase semi converters. Three-phase semi-converters and three-phase bridge rectifiers. DC-DC converters; principles of step-down operation, step-down converters with inductive load. Principle of step-up operation, step-up converter with resistive load. Performance parameters and converter classifications. Pulse width modulated inverters. Single and three-phase bridge inverters. Voltage					

	control of single-phase inverters.					
ELEE451	**MICROWAVE THEORY**	(3, 0 ,0)3	6	AE	-	English
Course Content	Definition of microwaves. Application areas. The microwave spectrum. Household electronic components and their frequencies of operation. Electromagnetic spectrum. Circuit representation of TL's, time domain TL equations, Lossless line, transmission lines with sinusoidal excitations, Finite transmission Lines. Impedance transformations, some special transformations on a lossless TL, some special transformations on a lossy TL. Impedance matching. The Smith chart. Definition of a Waveguide, classification of the modes of propagation, general solutions for TEM, TE and TM waves. Rectangular waveguides, TM modes, a separation of variables solution, propagation constant, cutoff frequency, the wave impedance, the guide wavelength, the phase velocity.					
ELEE461	**COMMUNICATION SYSTEMS II**	(3, 0 ,0)3	6	AE	-	English
Course Content	This senior-level 'Technical Elective' course assumes students' proficiency in signals and systems, frequency domain spectrum, and probability and statistics. It covers the fundamentals of digital communication systems and assesses the performance of digital signaling on physical channels. Topics include Binary On-off Keying (OOK), Phase-shift Keying (BPSK), and Frequency-shift Keying (FSK), along with Quadrature Phase-shift Keying (QPSK), M-ary Phase-shift Keying (MPSK), and Quadrature Amplitude Modulation (QAM) techniques. Probability theory, random variables, probability density functions, and random processes will be reviewed. Additionally, stationarity, ergodicity, correlation functions, power spectral density, Wiener-Khintchine Theorem, white noise, bandpass processes, and matched filters will be explored. Students will also analyze error probabilities for various signaling schemes in different noise scenarios, considering bandwidth and power requirements.					
ELEE464	**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.					
ELEE462	**WIRELESS COMMUNICATION**	(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.					
ELEE463	**INFORMATION THEORY**	(3, 0 ,0)3	6	AE	-	English

Course Content	Information theory describes the fundamental limits on our ability to store, process and communicate data, whether in natural or artificial systems. Understanding and approaching these limits is important in a wide variety of topics in informatics. The course includes -Differential Entropy and information content -Source coding theorem, Symbol codes, Kraft-McMillan inequality, Huffman codes, Stream codes, adaptive models, arithmetic coding, Compression in practice, Relative Entropy, mutual information, related inequalities, Noisy channel coding theorem, channel capacity, Error correcting codes, Codes robust to erasures, Lossy compression, Hash codes.					
ELEE471	**HIGH VOLTAGE TECHNIQUES**	(3, 0 ,0)3	6	AE	-	English
Course Content	Basic equations of electrostatic fields. Electric field and potential on planar electrode system. System capacity and forced. Electric field and potential on sphere electrode system and system's capacity. Sphere electrode system's examination for to breakdown. Electric field and potential on cylinder electrode system and system's capacity. Cylinder electrode system's examination for to breakdown. Parallel axis cylinder electrode systems. Maximum electric field's approximate calculation on electrode systems. Electrode systems with multi-dielectrics. Break on the limit surface. Discharge, ionization and types. Streamer or channel breakdown theory. Corona discharge and surface discharge. Electrical breakdown of dielectric liquids and solids, insulating materials, impulse voltage and current generator circuits.					
ELEE474	**DIGITAL IMAGE PROCESSING**	(3, 0 ,0)3	6	AE	-	English
Course Content	The signal and Image Processing course is organized to introduce the fundamentals of digital signal and image processing techniques. The emphasis will be on analysis tools, the design of digital filters, and the computation of the Discrete Fourier Transform (DFT). The course is designed to give all the fundamental concepts in digital image processing with an emphasis on spatial filtering, frequency domain filtering, image enhancement, image restoration, compression, and segmentation. Morphological image processing and the introduction to object recognition are the last topics of the course. Included these topics, the interpolation techniques, frequency domain filtering, and image-averaging methods for noise removal are important topics covered. The studied methods are experimented with using a simulator program.					
AINE201	**FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE**	(3, 0 ,0)3	6	AE	-	English
Course Content	Fundamentals of Artificial Intelligence provides a comprehensive introduction to AI concepts and techniques with a focus on engineering applications. Students will explore core areas including machine learning, deep learning, and advanced AI topics. The course covers supervised and unsupervised learning techniques, neural network architectures, and their applications in solving real-world engineering problems. Through hands-on programming assignments and a term project, students will gain practical experience in developing AI solutions using popular frameworks like TensorFlow and PyTorch. The course also addresses ethical considerations and future trends in AI, preparing students for advanced study and careers in AI engineering.					
AINE332	**DEEP NEURAL NETWORKS**	(3, 0 ,0)3	6	AE	ENGR104, STAT226	English
Course Content	Deep Neural Networks covers foundational topics such as the Perceptron learning algorithm and its convergence theorem. It delves into advanced concepts like the Multilayer Perceptron, learning mechanisms employing gradient descent and the backpropagation algorithm. Students explore nuances such as the impact of learning rate and momentum terms, addressing overfitting and techniques for generalization like regularization and weight elimination. The course also discusses challenges like the vanishing gradient problem and introduces Convolutional Networks, pivotal for tasks involving image and signal processing.					

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.					
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.					
SEWE422	**INTRODUCTION TO MOBILE APPS DEVELOPMENT**	(3, 0 ,0)3	6	AE	-	English
Course Content	This course provides a comprehensive foundation in designing, building, and deploying modern mobile applications for leading platforms. Students will learn industry-standard practices for creating responsive, user-centric apps, covering both native (iOS/Android) and cross-platform development frameworks. Core topics include mobile UI/UX design principles, platform-specific architectures, device API integration, state management, and performance optimization. The curriculum explores: application lifecycle management, adaptive interface development, local data storage (SQLite, Realm). Emphasis is placed on practical implementation using tools like Android Studio, Xcode, React Native, or Flutter.					