School	
Major	Bachelor of Science in Electrical Engineering

Major Requirements			
Code	**Title**	**Credits**	**Description**
EENG495	Senior Project	3	This course integrates the knowledge acquired in the various courses of the undergraduate curriculum to an open-ended design effort and applies the knowledge gained to the solution of a contemporary engineering problem. Students improve oral and written communication skills, gain familiarity with available technical literature, and experience the life cycle of a design project within a group environment. Many projects include practice in the use of computers and relevant support software while solving a design problem. Students work together as a team to accomplish common goals and be able to participate in regional & National competitions.
CENG400L	Microcontroller Applications Lab	1	This lab covers the programming and hardware application of ARDUINO microcontrollers' projects. This course contains an introduction to ARDUINO Atmega328P programming, Serial/Parallel bus interfacing with ARDUINO, using C languages in programming, using ISIS Proteus software for simulation, using ATMEL 7.0 software in editing, compiling, simulating and programming. The main objective of this laboratory is to cover experimentally all the applications on ARDUINO microchip Microcontroller. It is an integral part of the CENG380-Microprocessors and Microcontrollers and it reinforces and complements the material covered in this course.
EENG365	Electrical Wiring and Installation	3	
EENG435L	Control Systems Lab	1	This lab introduces experiments concerning designing, building, and testing control Systems which use analog controller circuits, electronics and technical lines circuits, speed, light and temperature control circuits. The 70082 and 70083 control system boards they cover experimentally as a virtual lab for the study of control system components and circuits. Each student will become familiar with all applications with open and closed loop control systems. The objectives of this course are to: The control Systems laboratory is an integral part of the course, and it reinforces and complements the material covered in the course. This is an introductory course in control systems theory. It is designed for students to not only learn about the basic control elements and how to connect them in circuits and find their solutions, but in doing so; he will also learn several basic mathematical techniques that will allow him to solve ordinary linear differential equations.
EENG435	Control Systems	3	This is an introductory course to control systems. Covered topics include: open-loop and closed loop feedback systems, mathematical modeling of control systems, block diagrams, transfer functions and state-space representations, modeling of electrical and mechanical systems, PID controllers, transient and steady-state response analyses, stability analysis of dynamic systems, control systems analysis by the Root-Locus method, design of Lead and Lag compensators, and control systems analysis and design by the frequency-response method.

EENG440	Electric Machines I	3	This course provides a review of the mechanical and electromagnetic fundamentals such as force, torque, energy, power, Ampere's law, Faraday's law, magnetic equivalent circuit, induced voltage and the operation of linear DC machine. It also includes real, reactive, and apparent power in AC circuits. Study of transformers includes types, construction, principles and operation of ideal and real single-phase transformers, turns ratio, equivalent circuit, performance characteristics, per-unit system, voltage regulation and efficiency, transformer taps, auto- transformers, three-phase transformers, instrument transformers. In depth explanations of DC machines covers construction, commutator action, armature windings, effect of armature reaction, interpoles and compensating windings, internal generating voltage, and torque equations of real DC machines, classifications, performance equations of generators and motors, starting and speed control of DC motors.
EENG388	Electromagnetic Fields and Waves	3	This is a comprehensive undergraduate course on electromagnetic fields and waves, discussing general Electro-magnetic Theory and covering the following topics: Vector analysis: Vectors in different coordinate systems, including Divergence, Gradient and Curl operators. The Electrostatic topics include: Coulomb's Law, Gauss's Law, Joule's Law and Electric Forces and Electric Potential. The Magneto-statics include: Biot-Savart's Law, Ampere's Law and Magnetic Forces and Torques. Finally, in Dynamic fields, the topics include Maxwell’s equations, Faraday's Law and Plane Wave Propagation.
EENG400L	Electronic Circuits II Lab	1	This laboratory experience learns to design and build more complicated circuits (systems) based on theoretical and analytical concepts. Design a complete electronic circuit system using different electronics components like OP-Amp, BJTs, MOSFETs and others to construct power amplifiers, oscillators and active filters in addition to many op Amp applications like adder, integrator, and differentiator. Moreover, this course deals with studying the high and low frequency response for the different types of transistors. Modeling the design of such circuits like active filters and oscillators using electronic simulators like LTspice takes a strong place in this course in addition to the different kinds of audio power amplifiers and then testing the completed circuit and verifying that it meets design specifications.
EENG400	Electronic Circuits II	3	This course covers FET and BJT amplifiers frequency response. It also introduces the analysis and design of a variety of amplifier output stages, power BJT. Negative feedback topologies and stability issue. Oscillators, multivibrators, timer, and precision rectifiers.
EENG385	Signals and Systems	3	This course introduces signals and systems, their types and properties, and their relation in the time and frequency domains. It covers signal and system modeling concepts, system modeling and analysis of LTI systems in time domain, the Fourier series, the Fourier transform and its applications, and the Laplace transformation and its applications.
EENG350L	Electronic Circuits I Lab	1	This lab introduces experiments concerning designing, building, and testing electronic circuits which use diodes, BJTs, and MOSFETs. The objectives of this lab are to: reinforce and complement the material covered in the course. It introduces experiments related to the design, implementation, and test the characteristics of different types of diodes and verifies practically some of its applications. Moreover, BJT and MOSFET characteristics as well as their different types of amplifier configurations are going to be modeled, implemented and tested.
EENG350	Electronic Circuits I	3	This course includes the following topics: Semiconductors, P-N Junction: current-voltage characteristics, Diode models, Diode circuit applications. Bipolar junction transistor (BJT): structure, current-voltage characteristics, DC biasing, small-signal model, BJT amplifiers. Metal Oxide Semiconductor Field-Effect Transistor (MOSFET): structure, current-voltage characteristics, DC biasing, small-signal model, MOSFET amplifiers.

EENG491	Electric Machines II	3	This course provides Electrical Engineering students with in-depth knowledge of electrical machines theories and analyses. It teaches the students the necessary techniques of solving problems. The equivalent circuits of AC machines including single and three-phase Induction machines, three phase Synchronous machines, and other special-purpose motors are used. Analysis and calculations to find the voltage regulation and efficiency of a machine at a certain load are included. The different practical applications of each machine are studied as well.
EENG300	Electric Circuits II	3	This course introduces the techniques of AC circuit analysis, containing ideal and dependent sources. It also covers sinusoidal steady state power calculations, balanced three phase circuits and frequency selective circuits.
EENG301L	Electric Circuits Lab	1	This lab introduces experiments concerning designing, building, and testing DC and AC electric circuits which use resistors, capacitors, inductors, transformers, and OP-AMP. The objectives of this course are to: reinforce and complement the material covered in the course. It enhances the technical abilities of the students by engaging them in experiments that involve most common electric lab equipment such as multimeter, function generator, DC source and oscilloscopes. Also, this lab offers the ability to test electric circuits using schematics software (LTspice). The lab concludes with designing applications on Filters and OP-AMP.
EENG410L	Power Electronics I Lab	1	This lab introduces experiments in designing, simulating, and testing power electronic circuits, covering various topics by using LTspice software to simulate the building circuits and get characteristics of power electronic component (Power diodes, Thyristors, TRIAC, DIAC, BJT, MOSFET, IJBT, and UJT).Then, implement circuits of the mentioned component on a breadboard as stated in manual book to develop and conduct appropriate experimentation to get formulation and consideration of relevant key variables. Also, analyze and interpret data of experiments to get results and conclusions.
EENG410	Power Electronics I	3	This course introduces a comprehensive overview of different power electronics components and applications. It also present converters used for DC machinery control (rectifiers, choppers) used in most applications. Their structures, switching techniques, harmonic content and performances are discussed.
EENG460	Introduction to Power Systems	3	This course introduces a comprehensive overview of electric circuit fundamentals, Generator and power transformer models, steady-state transmission lines parameters/operation and power flow analysis in an electric network system
CENG380	Microprocessors and Microcontrollers	3	This course introduces students to the principles of Microcontroller design and applications. Students will be introduced to the AVR microcontroller architecture. Moreover, the course introduces programming using AVR assembly language and the C programming language. Topics introduced will include: Hardware Architecture, looping, branching, arithmetic and logical operations, timer, interrupts, Parallel I/O and interfacing. .
CENG352L	Digital Logic Circuits Lab	1	This lab introduces experiments concerning designing, simulating and testing digital logic circuits, which uses Combinational Logic Design; Decoders and Encoders, Multiplexers, signed number notations and arithmetic's; binary addition/subtraction circuits; PLA, PAL, theory of sequential circuits; timing diagrams; analysis and synthesis of D, JK, and T flip flop based sequential circuit; Design with D and JK flip-flops. The objective of this course is to cover experimentally all experiments that are related to the topics above. After that, each group of two students should have the tools to build combinatory circuits as small project which allow him to submit the design and complete it by simulation and implementation.

EENG491L	Electric Machines II Lab	1	This lab introduces experiments in designing, simulating, and testing electric machines circuits, covering various topics by using LTspice software and MatLab to simulate the building circuits and get characteristics of single and three phase transformers by using LTspice software and to simulate the DC machines, AC single and three phase induction machines by using MatLab, and AC three phase synchronous machines by using MatLab also. Then, implement circuits of the mentioned machines on a panel as stated in the manual book to develop and conduct appropriate experimentation to get formulation and consideration of relevant key variables. Also, analyze and interpret data of experiments to get results and conclusions.
EENG250	Electric Circuits I	3	The course provides an introduction to Electrical and Electronics Engineering. The course has been designed to introduce fundamental principles of circuit theory commonly used in engineering research and science applications, the Concepts of voltage, current, power, resistance capacitance and inductance. Circuit analysis techniques such as Kirchhoff's Laws, node voltages, and mesh currents. Thevenin's and Norton's equivalent circuits, in addition to special circuits with op-amp and the response of 1st order RL and RC circuits.
EENG482	Electrical Systems Simulation	3	This introductory course presents numerical techniques implemented in MATLAB/Simulink for the solution of problems encountered in electrical engineering. Some of the major topics in this course include electric circuit analysis, electric machines modeling and computation of electromagnetic fields.

Core Requirements			
Code	**Title**	**Credits**	**Description**
MATH310	Probability & Statistics for Scientists & Engineers	3	The course is intended to provide you with the basic probabilistic and statistical concepts with related computational and analytic skills for three main purposes: 1) To become an integrated part of the student scientific education. 2) To give the student an adequate ability for comprehending and interpreting many non-deterministic situations. 3) To appreciate the wide range of applications of such concepts to real-life situations.
MATH210	Calculus II	3	This is the second course in the Calculus sequence. The course material includes logarithmic, exponential, and trigonometric functions, their inverses and their derivatives, integration techniques, improper integrals, sequences, infinite series, tests of convergence, alternating series, power series, polar coordinates and its application.
MENG250	Statics	3	This course treats only rigid-body mechanics and forms a suitable basis for the design and analysis of many types of structural, mechanical, or electrical devices encountered in engineering. As the course name suggests, this course deals with the equilibrium of bodies that are either at rest or move with constant velocity. Therefore, this Statics course provides the students with the principles that treats the statics of particles and rigid bodies, trusses, frames, machines; centroids, centers of gravity; and friction.
MENG225	Engineering Drawing & CAD	3	This course consists of two parts: 2 D and 3D. It can be defined as a tool in order to generate accurate drawings due to scales in 2 D and in 3 D. It focuses on drawings related to engineering. Drawings may be "descriptive", describing an object or a tool, or they may represent the first step of design (Design of tools and machines).
CSCI250	Introduction to Programming	3	This course introduces the basic concepts and principles of structured programming in Java. It starts with an introduction to Java showing its syntax and the structure of a program in Java then teaches simple data types, control structures, methods, arrays, and strings.

CSCI250L	Introduction to Programming Lab	1	This course is a co-requisite for the Introduction to Programming course (CSCI250). The students apply in the lab the fundamentals of programming explained in CSCI250 by solving lab exercises. In this lab, students solve programming problems by using primary data types, selection and repetition structures, methods and arrays. This lab is an opportunity for the students to have direct help when needed from the instructor, but it is not sufficient for practice; students should practice with more exercises on their own.
MATH220	Calculus III	3	The course consists of two parts: Multivariable calculus and vector calculus. The multivariable calculus is the extension of calculus in one variable to calculus in more than one variable: (quadric surfaces, partial differentiation, multiple integration). Vector calculus applies calculus to the concept of vector fields.
MATH225	Linear Algebra with Applications	3	This course provides an introduction to linear algebra topics. Emphasis is placed on the development of abstract concepts and applications for vectors, systems of equations, matrices, determinants, vector spaces, multi-dimensional linear transformations, eigenvectors, eigenvalues, diagonalization and orthogonality. The concepts of linear algebra are extremely useful in physics, economics and social sciences, natural sciences, and engineering.
MATH270	Ordinary Differential Equations	3	This course provides an introduction to ordinary differential equations and their applications. The contents of this course include first order equations, separable, exact, and linear equations, second and higher order differential equations, systems of differential equations, series solutions, and Laplace transformation.
PHYS220	Physics for Engineers	3	This course is designed to provide an overview of calculus based introductory physics, which is a requirement for all undergraduate engineering students. It offers an introduction to mechanical oscillations and mechanical waves, exploring different wave phenomena such as interference of mechanical waves, reflection and refraction of light, in addition to image formation.
CENG250	Digital Logic I	3	This course introduces the concepts of digital logic operations and design. The course teaches fundamentals of digital logic design through the use of a large number of design problems. Topics include: Boolean algebra, theory of logic functions; mapping techniques and function minimization; logic equivalent circuits and gate transformations; base conversion number notations and arithmetic; binary addition/subtraction, decoder, encoder, comparator, multiplexer and de-multiplexer circuits in combinational systems.
ENGG200	Introduction to Engineering	3	Introduction to Engineering is a first-year course designed to help students explore the world of engineering by introducing them to what engineers do, the fundamental principles that form the basis of their work, and how they apply that knowledge within a structured design process. The course gives the student an opportunity to apply those concepts by developing a prototype system as part of a team. The course also enables the student to develop technical presentation skills.

General Education Requirements			
Code	**Title**	**Credits**	**Description**
ARAB200	Arabic Language and Literature	3	ØªØªØ£Ù□Ù□ Ù□Ø§Ø¯Ø© Ø§Ù□Ù□ØºØ© Ø§Ù□Ø¹Ø±Ø¨Ù□Ø© Ù□Ø¢Ø¯Ø§Ø¨Ù□ Ù□ØºÙ□Ø± Ø§Ù□Ù□ØªØ®ØµÙ□Ù□ Ù□Ù□Ø«Ù□Ø§Ø«Ø© Ø£Ù□Ø³Ø§Ù□Ø□ Ø£ØØ¯Ù□Ø§ Ù□ØªÙ□Ø§Ù□Ù□ Ø¯Ø±Ù□Ø³Ù□ Ø£Ø³Ø§Ø³Ù□Ø© Ù□Ù□ Ø§Ù□Ù□ØÙ□ Ù□Ø§Ù□ØµØ±Ù□Ù□Ø§Ù□Ø¨Ù□Ø§ØºØ©. Ù□Ø§Ù□Ø«Ø§Ù□Ù□ Ù□ØªÙ□Ø§Ù□Ù□ Ù□Ø¨Ø§ØØ« Ù□Ù□ Ø§Ù□Ø£Ø¯Ø¨ Ù□Ø§Ù□ØªÙ□Ù□Ù□. Ø£Ù□Ø§ Ø§Ù□Ù□Ø³Ù□Ø§Ù□Ø«Ø§Ù□Ø« Ù□Ù□Ø¹Ø§Ù□Ø¬ Ø¨Ø¹Ø¶ ØªÙ□Ù□Ù□Ø§Ø§ Ø§Ù□ØªÙ□Ø§Ù□Ø¹Ø¨Ù□Ø± Ù□Ø§Ù□ØªÙ□Ø§Ù□Ø¬Ù□.

CULT200	Introduction to Arab - Islamic Civilization	3	ØªÙ□Ù□Ø«Ù□Ù□ Ø§Ù□ØØ¶Ø§Ø±Ø© Ø§Ù□Ø¹Ø±Ø¨Ù□Ø© Ø§Ù□Ø¥Ø³Ù□Ø§Ù□Ù□Ø© Ù□Ø§ØØ¯Ø© Ù□Ù□ Ø£Ù□Ù□ Ø§Ù□Ø-Ø¶Ø§Ø±Ø§Øª Ù□Ù□ Ø§Ù□ØªØ§Ø±Ù□Ø® Ø¨Ù□Ø§ Ø£Ù□Ø¬Ø²ØªÙ□ Ù□Ù□ Ø¥Ù□Ø§ Ø¹Ù□Ù□Ù□Ø© Ù□Ø«Ù□Ø§Ù□Ù□Ø© Ù□ØØ¶Ø§Ø±Ù□Ø© ØªØ±Ù□Ø§ Ø£Ø«Ø±Ù□Ø§ Ø§Ù□Ø¹Ø¸Ù□Ù□ Ù□Ù□ ØªØ§Ø±Ù□Ø® Ø§Ù□Ø¨Ø´Ø±Ù□Ø©. ØªÙ□Ø´Ù□Ù□Ù□ Ù□Ø°Ù□ Ø§Ù□Ù□Ø§Ø¯Ù□Ø© Ø§Ù□Ø¯Ø±Ø§Ø³Ù□Ø© Ù□Ù□Ø¢Ø³Ù□Ø© Ù□Ø¹Ø¨Ù□ Ø¹Ø±Ø¨Ù□ ØªØ§Ø±Ù□Ø® Ø-Ø¶Ø§Ø±Ø§Ù□Ø□ Ù□Ø§ Ù□Ù□Ù□ØªØ®Ø± Ø¨Ù□Ø§ Ù□ØØ³Ø¨Ø□ Ø¨Ù□Ù□Ø¬Ø¹Ù□ Ù□Ù□Ø§Ù□Ø§ ØØ§Ù□Ø²Ù□Ø§ Ù□Ø³ØªÙ□Ù□Ø¶ Ø¨Ù□Ù□Ø§Ù□Ù□Ù□Ø§ØªÙ□ Ù□Ù□Ø¯Ø§Ø±Ø§Ø§Ù□Ø© Ø§Ù□Ø¹Ù□Ù□Ù□Ø© Ø§Ù□Ù□Ø§Ù□Ù□Ø© Ù□Ø¥Ø¹Ù□Ø§Ø© Ø¨Ù□Ø§ Ø§Ù□Ø§Ø³ØªÙ□Ù□Ø§Ø¶ Ø§Ù□Ø-Ø¶Ø§Ø±Ø§Ù□Ø□. Ù□ØªØØ±Ù□ Ø§Ù□Ù□Ø§Ø¶Ù□ Ù□Ù□Ù□Ø§ Ø¯Ù□Ù□Ø´Ø¹Ù□Ø±Ù□ Ù□Ø§Ø¹Ù□ Ù□Ù□Ù□Ø§Ø□ Ø¹Ù□Ù□ Ø£Ù□Ù□ Ù□Ø°Ø§Ù□Ù□Ø±Ù□Ø± Ø§Ù□Ø¯Ø±Ø§Ø§Ù□ Ù□ØØ§Ù□Ù□ Ø£Ù□Ù□Ù□Ø³ØªØ«Ù□Ø± Ø§Ù□Ø¹Ù□Ø¹Ù□ Ø§Ù□ØØ¶Ø§Ø±Ù□ Ù□Ø§Ù□Ø«Ù□Ø§Ù□Ù□Ø© Ù□Ø§Ù□Ø¹Ù□Ø¯ Ø§Ù□Ø¹Ø±Ø¨Ø□ Ù□Ù□Ø³ØªÙ□Ù□ Ù□Ù□Ù□Ø° Ø§Ù□Ù□Ø®Ø²Ù□Ù□ Ù□Ù□ØµÙ□Ø¹ Ø£Ù□Ù□Ù□Ù□Ø§ Ø¬Ù□Ù□ Ù□Ù□Ù□Ø³ØªÙ□Ø¨Ù□.
ENGL201	Composition and Research Skills	3	This course builds upon the skills acquired in pre-requisite courses mainly ENGL 151 to further develop students' critical thinking and academic writing competencies. Students will read and respond to a variety of texts from different disciplines and produce a research paper using analytical and critical skills in response to texts.
ENGL251	Communication Skills	3	Workplace Occupational Writing is an advanced interdisciplinary writing course emphasizing workplace and technical communication and editing appropriate to diverse professions. It incorporates practice and study of selected types of discourse employed in professional writing situations, preparing students for different systems of writing in their professional lives. Examples from the writing of workplace professionals are analyzed and used as models to demonstrate the transition from academic to professional writing.
ENGG300	Engineering Economics	3	This course covers the fundamentals of Engineering Economics for engineering professionals to match engineering practice today. It recognizes the role of the engineer as a decision maker who has to make and defend sensible decisions. It emphasizes on the analytical consideration of money and its impact on decision making as well as on other factors such as environmental and social factors and tasks. By the end of the course students will be equipped with basic analytical skills for solving problems of an economic nature real-world example.
ENGG450	Engineering Ethics and Professional Practice	3	Engineering Ethics and Professional Practice is a complete study course on the role of ethics in engineering in their historical, philosophical and professional contexts. The course examines the impact of ethical theories and their application to issues encountered in the engineering profession, such as employee rights, whistleblowing, safety, risk and liability, professional responsibility to consumers and employers, conflicts of interest, codes of ethics, legal obligations, environmental and social responsibility. Through the use of real and hypothetical case studies, the course focuses on developing analysis techniques and applying them to ethical problems through independent critical thinking and moral sensitivity.