School	
Major	Bachelor of Science in Mechanical Engineering

Major Requirements			
Code	**Title**	**Credits**	**Description**
MENG495	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 and national competitions.
MENG450	Mechanical Systems I	3	This course deals with kinematics and dynamics of machinery such as Linkages. The purpose of this course is to explore the kinematics and dynamics of machinery in respect to the synthesis of mechanisms in order to accomplish desired motions or tasks, and also the analysis of mechanisms in order to determine their rigid-body dynamic behavior. These topics are fundamental to the broader subject of machine design. The topic of synthesis of mechanisms will be explored. Then techniques of analysis mechanism will be investigated.
MENG430	Mechanical Vibrations I	3	Physical systems such as vehicles suspensions, engines mounts, engines valves and airplanes wings are modeled as discrete systems so that the equations of motions are derived using both Newton’s second law, and energy methods including Lagrange formulations. This course concentrates on free vibration of damped and undamped single degree of freedom systems, harmonically excited vibration, and two degree of freedom systems and multi-degree of freedom systems. Furthermore, multiple-degree-of-freedom systems are covered for damped and undamped cases; the symmetric Eigenvalue problem is used to extract the natural frequencies from the spectral matrix and Modal analysis is employed, for both free and forced response, to find the solutions of the coupled systems. Also, this course presents briefly methods of design for vibration suppression
MENG420L	Heat Transfer Lab	1	Linear heat conduction. Radial heat conduction. Unsteady state heat transfer. Forced convection. Concentric tube heat exchanger both for co-current and counter current flows. Radiant heat transfer and heat exchange using Stephan-Boltzmann theory.
MENG420	Heat Transfer	3	This course is an introduction to basic concepts of engineering heat transfer: Steady and transient heat conduction in solids including the effect of heat generation, finned surfaces, correlation formulas for forced and free convection, design and analysis of heat exchangers, radiation heat transfer, and problems in combined convection and radiation.

MENG410	Mechanics of Materials II	3	This course is intended to provide the student with a comprehensive presentation of both theory and application of the fundamental principles of mechanics of materials. The course deals with deformable bodies; consequently it is based on the understanding of the physical behavior of materials under load and then modeling this behavior to develop the theory. Focusing on the importance of satisfying equilibrium, compatibility of deformation and material behavior requirements. At the end of the course, the students will be able to analyze structural and mechanical components, develop comprehensive understanding of the material of which they are made. The skills that developed in learning the analysis will be applied in design courses where students learn how to synthesize structural and mechanical components. Based on the aforementioned overview, this course will deal with the study of flexure and deflection of beams, eccentric loads, experimental determination of principal stresses, buckling of columns. Statically indeterminate problems are also covered.
MENG370L	Fluid Mechanics I Lab	1	Calibration of a pressure gage. Pressure measurement methods. Viscosity measurement. Venturi meter. Fluid friction in straight pipes and in bends. Pressure distribution around an Airfoil (Drag and Lift)
MENG370	Fluid Mechanics I	3	Introduction to fluid properties, pressure distribution in fluid, hydrostatic forces on plane and curved surfaces, buoyancy and stability, and pressure measurement. Integral relations for a control volume, mass conservation, linear and angular momentum equations, energy and Bernoulli equations are discussed. Differential relations for a fluid particles, fluid acceleration, mass conservation, linear and angular momentum equations, and energy equation are introduced. Dimensional analysis and similarity, principle of dimensional homogeneity Pi theorem, non-dimensionalization of basic equations, modeling and its pitfalls. Flow in ducts and boundary layer flows.
MENG360L	Mechanics Of Materials I Lab	1	This lab course treats the stress, strain, and stress-strain relations. A brief discussion of mechanical properties and types of loads. Separate treatments for members subjected to axial loads (normal forces). Torsion shear. Bending and transverse shear (flexure).
MENG360	Mechanics of Materials I	3	This course shows the relationships between the external loads applied to a deformable body and the intensity of internal forces acting within the body. An introduction to stress, strain, and stress-strain relations and a brief discussion of mechanical properties and types of loads is presented. Separate treatments for members subjected to axial loads (normal forces), torsion, bending and transverse shear (flexural) are studied throughout this course for materials with linear-elastic behavior.
MENG320L	Engineering Thermodynamics I Lab	1	Temperature measurement methods demonstration including Peltier thermoelectric effect. Boyle’s Law demonstration. Perfect gas law, applying the first law of thermodynamics for the calculation of the heat capacity ratio of the air. Pressuretemperature relationship analysis for water/steam. Heat output and COP of a heat cycle of the Mechanical Heat Pump. Practical and ideal cycles of Mechanical Heat Pump.
MENG320	Engineering Thermodynamics I	3	This course introduces and discusses the concepts and fundamentals of temperature and thermometry, equations of state for fluids, work, heat, the first law, internal energy, enthalpy, specific heats, energy equations for flow, change of phase, the second law, reversibility, entropy; combined first and second laws.

MENG310	Engineering Material Science	3	An introduction to materials science and different types of materials. The coupling between the chemical properties of elements, atomic structure and inter-atomic bonds is detailed. The interaction between molecular, crystal structure, microstructure and chemical and mechanical properties are emphasized. Crystal defects and diffusion in materials are treated as well as binary phase diagrams. The themes materials selection- and development, processing and properties (chemical and physical) are detailed.
MENG300	Dynamics	3	Analysis of the motion of rigid-bodies in 2-D by dealing with the kinematics and kinetics aspects. Focus on how to solve engineering problems using different techniques including Newton's second law, principle of work and energy, and principle of momentum and impulse.
MENG430L	Mechanical Vibrations I Lab	1	Physical systems such as vehicles suspensions, engines mounts, engines valves and airplanes wings are modeled as discrete systems so that the equations of motions are derived using both Newton's second law, and energy methods including Lagrange formulations. This course concentrates on free vibration of damped and undamped single degree of freedom systems, harmonically excited vibration, vibration under general forcing conditions, and two degree of freedom systems and multi-degree of freedom systems. Furthermore, general forced response are investigated and includes impulse response function, response to an arbitrary input, and response to an arbitrary periodic input using Fourier series, also shock spectrum is examined. Multiple-degree-of-freedom systems are covered for damped and undamped cases; the symmetric Eigenvalue problem is used to extract the natural frequencies from the spectral matrix and Modal analysis is employed, for both free and forced response, to find the solutions of the coupled systems. Also, this course presents briefly methods of design for vibration suppression.
EENG492	Electric Machines For Mechanical Engineers	3	This course provides Mechanical Engineering students with knowledge of electrical machines theories and applications. It introduces transformers and all types of DC and AC machines. This includes three-phase Induction, and Synchronous machines, single-phase induction machines, as well as, special purpose machines. Analysis and calculations for finding the voltage regulation and efficiency of those transformers and machines are included, together with their different applications.
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.
MENG450L	Mechanical Systems I Lab	1	This lab course includes an introduction to 2D and 3D modeling of sketches and parts respectively plus an introduction to mechanical assemblies in 3D. The animation, kinetic and kinematic studies of mechanical assemblies such as three and four-bar linkage systems will be done using motion analysis solver. The design and modeling are done using SolidWorks
MENG470	Internal Combustion Engines	3	This course covers basic internal combustion engine types and their operation, engine design and operating parameters, thermo-chemistry and combustion, engine cycles, engine friction, and engine flows and heat transfer processes. Engine combustion phenomena, emission and air pollution will also be discussed.

EENG492L	Electric Machines For Mechanical Engineers Lab	1	This lab introduces experiments on all types of DC and AC machines and transformers. This includes Induction, Synchronous three-phase machines, single-phase induction machines and special purpose machines. As well as the analysis and calculations required for each experiment (voltage regulation, current, torque and efficiency)
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).

Core Requirements			
Code	**Title**	**Credits**	**Description**
MATH375	Numerical Methods for Scientists & Engineers	3	This course is a study of mathematical techniques used to find numerical solutions to the mathematically formulated problems that do not have exact analytical solutions. This course includes the following computational techniques: root-finding techniques, interpolation and polynomial approximation, numerical differentiation and integration, extrapolation techniques and numerical schemes for solving initial-value problems for first and higher order ordinary differential equations. In computer practical, laboratory sessions involve the implementation of the above numerical methods in practice using MATLAB.
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.
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.
CHEM200	General Chemistry	3	This course is a first semester course, intended for students who desire to acquire the basic principles in chemistry. The emphasis of the course will be on the fundamental principles of general chemistry, which include terminology, qualitative concepts and quantitative skills. The general topics included in this course are: Quantum Theory of the Atom; Electrons and Periodicity; Bonding; Molecular Geometry; Hybridization; Acid/base Chemistry; Kinetics and reactions mechanism and Solubility and Complex ion equilibria.

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.
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.
EENG370	Industrial Electronics	3	This course introduces many topics related to the operation of basic electrical components and circuits allowing to gain a good grounding in the basics, and to progress into the detail only as far as is appropriate for the need. These topics include: Steady-State Sinusoidal Analysis, Sensors & Actuators, Amplification, Control & Feedback, Operational Amplifiers, Diodes, Field-effect Transistors, Bipolar Junction transistors and Digital Systems.
EENG370L	Industrial Electronics Lab	1	This lab introduces experiments concerning designing, building, and testing AC sinusoidal steady state and electronic circuits which use diodes, BJTs, and MOSFETs

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□Ø§ Ù□ØºÙ□Ø± Ø§Ù□Ù□ØªØ®ØµØµÙ□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□Ø³Ø§Ù□ 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¨ØØ« Ù□Ù□ Ø§Ù□Ø£Ø¯Ø¨ Ù□Ø§Ù□ØªØÙ□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§Øª Ø§Ù□ØªØ¹Ø¨Ù□Ø± Ù□Ø§Ù□ØªÙ□Ø§ØµÙ□.
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¥Ø¨Ø¯Ø§Ø¹Ø§Øª Ø¹Ù□Ù□Ù□Ø© Ù□Ø«Ù□Ø§Ù□Ù□Ø© Ù□ØØ¶Ø§Ø±Ù□Ø© ØªØ±Ù□Øª 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¯Ø© Ø§Ù□Ø¯Ø±Ø§Ø³Ù□Ø© Ù□Ù□Ø¯Ù□Ø©Ù□ Ø£Ø³Ø§Ø³Ù□Ø© Ù□Ù□ØªØ¹Ø±Ù□ Ù□Ù□ Ø¹Ø±Ø¨Ù□ Ø¹Ù□Ù□ ØªØ§Ø±Ù□Ø® Ø-Ø¶Ø§Ø±ØªÙ□Ø□ Ù□Ø§ Ù□Ù□Ù□ØªØ®Ø± Ø¨Ù□Ø§ Ù□ØØ³Ø¨Ø□ Ø¨Ù□ Ù□Ù□Ø¬Ø¹Ù□ Ù□Ù□Ù□Ø§ ØØ§Ù□Ø²Ù□Ø§ Ù□Ø³ØªÙ□Ù□Ø¶ Ø¨Ù□ Ù□Ø§Ø¨Ù□Ù□Ù□Ø§ØªÙ□ Ù□Ù□Ø¯Ø±Ø§ØªÙ□ Ø§Ù□Ø¹Ù□Ù□Ù□Ø© Ø§Ù□Ù□Ø§Ù□Ù□Ø© Ù□Ø¥Ø¹Ø§Ø¯Ø© Ø§Ù□Ø§Ø³ØªÙ□Ù□Ø§Ø¶ Ø§Ù□Ø-Ø¶Ø§Ø±Ù□. 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§ Ø§Ù□Ù□Ù□Ù□Ø±Ù□Ø± Ø§Ù□Ø¯Ø±Ø§Ø³Ù□ Ù□ØØ§Ù□Ù□ Ø£Ù□Ù□ Ù□Ø³ØªØ«Ù□Ø± Ø§Ù□Ù□Ø¹Ù□ Ø§Ù□ØØ¶Ø§Ø±Ù□ Ù□Ø§Ù□Ø«Ù□Ø§Ù□Ù□ Ø¹Ù□Ø¯ Ø§Ù□Ø·Ù□Ø§Ø¨ Ø§Ù□Ø¹Ø±Ø¨Ø□ Ù□Ù□Ø³ØªÙ□Ù□Ø¯ Ù□Ù□ Ù□Ø°Ø§ Ø§Ù□Ù□Ø®Ø²Ù□Ù□ Ù□Ù□ØµÙ□Ø¹ Ø£Ù□Ù□Ù□Ù□Ø§ Ø¬Ø¯Ù□Ø¯Ù□Ø§ 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.
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.