School	School of Engineering
Major	Mechanical Engineering

General Education Requirements			
Code	**Title**	**Credits**	**Description**
ARAB200	Arabic Language and Literature	3	This course is a comprehensive review of Arabic Grammar, Syntax, major literature and poetry styles, formal and business letters.
CULT200	Introduction to Arab - Islamic Civilization	3	The purpose of this course is to acquaint students with the history and achievements of the Islamic civilization. Themes will include patterns of the political and spiritual leadership; cultural, artistic, and intellectual accomplishments Prerequisites: ENGL051, ENGL101, ENGL151.
ENGL201	Composition and Research Skills	3	This course focuses on the development of writing skills appropriate to specific academic and professional purposes; the analysis and practice of various methods of organization and rhetorical patterns used in formal expository and persuasive writing; the refinement of critical reading strategies and library research techniques; and the completion of an academically acceptable library research paper. Prerequisites: ENGL150, ENGL151.
ENGL251	Communication Skills	3	The objectives of this course are to improve students' writing skills for academic purposes by developing effective use of grammatical structures; analytical and critical reading skills; a sensitivity to rhetorical situation, style, and level of diction in academic reading and writing; and competence in using various methods of organization used in formal writing.

Major Requirements			
Code	**Title**	**Credits**	**Description**
MENG495	Senior Project	3	This project is a requirement for graduation with the B.S. in Engineering degree. Proposed by the supervising faculty, projects are geared towards integrating several topics covered in the curriculum. Students will have the opportunity to exercise research, experimentation, implementation and technical writing skills. Students typically work in teams; each team agrees on a project with the supervisor. The project scope must be adjusted to match at least a 3 credit load per team member. The project concludes with a demonstration, a presentation and a technical report all of which are appraised by a committee of faculty members.
MENG450	Mechanical Systems I	3	This is the first course which 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__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 firstly. Then techniques of analysis mechanism will be investigated. It is hoped that this approach will help in developing the students' ability to design viable mechanism solutions to real, unstructured engineering problems by using a design process.
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 Eigen value 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	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. Problems in combined convection and radiation.
MENG410	Mechanics of Materials II	3	This course is intended to provide the students 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	Demonstration of the pressure measurement methods. Calibration of the pressure gauges. Determining the viscosity of the fluid (water). Pressure distribution study. Measuring and studying the moment due to the fluid thrust. Measuring the fluid friction. Demonstrating the dependency of the flow on Reynold's number. Pressure distribution around airfoil.
MENG370	Fluid Mechanics I	3	Introduction, fluid properties, pressure distribution in fluid, hydrostatic forces on plane and curved surfaces, buoyancy and stability, pressure measurement. Integral relations for a control volume, mass conservation, linear and angular momentum equations, energy and Bernoulli equations. Differential relations for a fluid particles; fluid acceleration, mass conservation, linear and angular momentum equations, energy equation. Stream function, vorticity and irrotationality, frictionless irrotational flows, plane potential flows. 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	Determine the stress-strain diagram governing the behavior of the material from which the mechanical properties of the material under test can be extracted. These properties are mainly represented by the modulus of elasticity E, Poisson's ratio ν, percentage of elongation, modulii of resilience and toughness, yielding, ultimate and fracture__rupture strengths. Performing a twist__torque experiment to obtain/sketch the behavior of the material under test due to shear forces represented by the applied torque, and to determine modulus of rigidity G of the material.
MENG360	Mechanics of Materials I	3	This course studies 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 are presented. Separate treatments for members subjected to axial loads (normal forces), torsion, bending and transverse shear (flexure) are studied throughout this course for materials with linear-elastic behavior.
MENG350	Mechanics III (Dynamics II)	3	This course treats only rigid-body mechanics and forms a suitable basis for dynamics problems encountered in engineering. As the course name suggests, this course deals with the accelerated motion of a body. In this course the subject of dynamics will be presented in two parts: Kinematics, which treats only the geometric aspects of the motion and Kinetics, which is the analysis of the forces causing the motion. Consequently, this course focuses on kinematics of rigid bodies in plane motion, forces, accelerations, and energy and momentum methods for rigid bodies in plane motion. Motion of rigid bodies in three dimensions is also treated.
MENG320L	Engineering Thermodynamics I Lab	1	Different types of temperature measurement devices. Peltier thermo-electric effect. Investigation of Boyle's Law. Perfect gas law demonstrator, where the first law of thermodynamics is applied for the calculation of the heat capacity ratio of the air. Investigation of the pressure-temperature relationship for water/steam. Comparison of practical and ideal cycles on a P-H diagram and determination of energy balances for condenser and compressor.
MENG320	Engineering Thermodynamics I	3	Temperature and thermometry; equations of state for fluids and solids; work, heat, and the first law; internal energy, enthalpy, and specific heats; energy equations for flow; change of phase; the second law, reversibility, absolute temperature, and entropy; combined first and second laws; availability. Applications to a wide range of processes and devices.

MENG310	Engineering Material Science	3	This course presents an introduction to materials science for engineers. It tackles three keywords: science, 11 of 12 materials and engineering. The word science deals with the fundamentals of structure and classification. “Materials” deals with the four types of structural materials which are metals, ceramics and glasses, polymers and composites and with the electronic materials (semi-conductors). Finally, the word engineering puts the materials to work with discussions of key aspects of the degradation and selection of materials. Prerequisites: MENG250. Co-requisites: CHEM200.
MENG300	Mechanics II (Dynamics I)	3	This course treats only rigid-body mechanics and forms a suitable basis for dynamics problems encountered in engineering. As the course name suggests, this course deals with the accelerated motion of a body. In this course the subject of dynamics will be presented in two parts: Kinematics, which treats only the geometric aspects of the motion and Kinetics, which is the analysis of the forces causing the motion. Consequently, this course focuses on Kinematics of particles; kinetics of particles: Newton’s second law, work-energy and impulse-momentum methods, moments of inertia of areas and masses. Prerequisites: ENGL051, ENGL101, MENG250. Co-requisites: MATH220.
MENG430L	Mechanical Vibrations I Lab	1	Mechanical Vibrations I Lab
MENG450L	Mechanical Systems I Lab	1	This is a tutorial of MENG450 course (Mechanical systems I). Students are brought to solve problems exploring the kinematics and dynamics of machinery. The design and synthesis of mechanisms are present in many problems in order to accomplish desired motions__tasks. Other problems focus on the analysis of the kinematics of mechanisms in order to determine their rigid-body motion. Also the rigid body dynamic behavior will be investigated in other problems by using different methods like Newton's laws and energy method. It is hoped that this tutorial will be an added value to the course that help in developing the students’ ability to design viable mechanism solutions to real.
EENG492	Electric Machines For Mechanical Engineers	3	This course provides students with in depth knowledge of electrical machinery theory. It introduces all types of DC and AC machines and transformers. This includes Induction, Synchronous three-phase machines, and single-phase induction machines as well as special purpose machines. Analysis and calculations for finding the voltage regulation and efficiency of those machines are also included.

EENG435	Control Systems	3	Introduction to Control Systems. Open and Closed-loop feedback systems. Modelling of dynamic. Block diagrams and signal flow graphs. Transient and steady state response analysis. Root-Locus analysis, stability of control systems. Control system design (Lead, Lag, and Lead-Lag compensation), Frequency response analysis techniques. PID, PD and P correctors.
MENG470	Internal Combustion Engines	3	Basic internal combustion engine types and their operation, engine design and operating parameters, thermo-chemistry and combustion, engine cycles, gas exchange process. Engine combustion phenomena, emission and air pollution. Advanced topics and trends in combustion engine design.
EENG492L	Electric Machines For Mechanical Engineers Lab	1	Electric Machines For Mechanical Engineers Lab.
MENG250	Mechanics I (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,__electrical devices encountered in engineering. As the course name suggests, this course deals with the equilibrium of bodies that are either at rest__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. Prerequisites: ENGL051. Co-requisites: MATH210.
MENG225	Engineering Drawing & CAD	3	This course consists in 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__a tool,__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	Bases and number representation, analysis of error propagation and error correction, roots for non-linear equations, computational linear algebra, polynomial interpolation, approximation of functions by polynomials, numerical differentiation and integration, numerical methods for solving differential equations, Runge-Kutta method, numerical methods for solving systems of equations and differential equations. Prerequisite: MATH 265 and CSCI 250.
MATH310	Probability & Statistics for Scientists & Engineers	3	The concept of probability and its properties, descriptive statistics, discrete and continuous random variables, expected value, distribution functions, the central limit theorem, random sampling and sampling distributions, Hypothesis testing. Prerequisite: MATH 170
IENG300	Engineering Project Management	3	This course covers the fundamentals of project management for engineering professionals. It reviews the project management framework in organizations and covers in-depth the tools and techniques used in initiating, planning, executing, monitoring, controlling and concluding a project to achieve the set goals within schedule and budget targets. Real life engineering project examples are used to demonstrate the application of project management concepts to engineering projects. The course is aligned with the Project Management Institute's (PMI's) Project Management Body of Knowledge (PMBOK) and helps learners to prepare for PMI certification exams. Prerequisites: ENGL201.
EENG301L	Electric Circuits Lab	1	The Electric Circuits Lab introduces the students to circuit simulation tools, DC circuit analysis techniques such as nodal, mesh, Thevenin, Norton, & superposition, and transient circuit analysis of RC, RL, & RLC circuits.
EENG300	Electric Circuits II	3	Introduce techniques of AC circuit analysis, containing ideal and dependent sources. Covers sinusoidal steady state power calculations, balanced three phase circuits, frequency selective circuits and two-port circuits in addition to Operational amplifiers (Op-amps).
MATH210	Calculus II	3	The course material includes hyperbolic functions and their inverses and their derivatives integration techniques, improper integrals, sequences, infinite series, power series, Taylor and Maclaurin series and application of power series. The mathematical software Maple will be introduced and used in support of the comprehension of the material. Prerequisites: MATH160

EENG250	Electric Circuits I	3	Introduce techniques of DC circuit analysis (Node, Mesh, Superposition, & Source Transformation) containing ideal and dependent sources. Covers real power calculations, perform equivalent resistive circuits. Introduce concept of Thevinin and Norton equivalent circuits, basic concept of mutual inductance, and determine the transient responses of RL, RC, parallel and series RLC. Prerequisites: ENGL051. Co-requisites: MATH210
CHEM200	General Chemistry	3	Basic principles of chemistry, electronic structure of the atom, chemical periodicity, molecular structure and bonding, acids and bases and the states of matter, rates of chemical reactions, and chemical equilibrium are covered in this course. Prerequisites: ENGL 150; CHEM, or S grade on the Chemistry Placement Test Prerequisites: CHEM160, ENGL101. Co-requisites: CHEM200L.
CSCI250	Introduction to Programming	3	This course introduces the basic concepts and principles of structured programming in Java. It starts by 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. The objective of the lab is to implement programming problems using basic data types, selection and repetition structures, methods and arrays.
MATH220	Calculus III	3	This text covers basic topics on infinite series, lines and planes in space, cylinders and quadric surfaces, functions of several variables, limits and continuity, Partial derivatives, chain rule, directional derivatives, Gradient vector, tangent planes, double and triple integrals, areas, moments, center of mass, volumes, double integrals in polar forms, triple integrals in cylindrical and spherical coordinates, line integrals, vector fields Green's theorem, surface integrals, Stokes theorem, and the divergence theorem. Students are required to solve extensive number of problems and computer assignment using the mathematical software package Maple.
MATH225	Linear Algebra with Applications	3	Introduction to the systems of linear equations and matrices, Gaussian eliminations, matrix operations, inverses, types of matrices, determinants and their applications, vector spaces, subspaces, linear independence, basis and dimension, rank and nullity, inner product spaces and orthogonal bases, eigenvalues and eigenvectors, applications from other disciplines such as physics, computer science, and economics.

MATH270	Ordinary Differential Equations	3	First-order equations, linear and non-linear differential, linearization, numerical and qualitative analysis, second-order equations, existence-uniqueness theorem, series solutions, Bessel s and Legendre s functions, Laplace transforms, systems of differential equations, applications and modeling of real phenomena. Prerequisite: MATH 220.