

School			
Major	Masters of Science in Mechanical Engineering		
Major Requirements			
Code	Title	Credits	Description
MENG695A	Master Thesis Project(Part I)	3	The Master's Project course is a six credits practical and research course. The master project is spread over two semesters. Students are requested to conduct a research relevant to the field of specialty; ending up with a thesis describing methodology; applications and results. The course also includes the realization of a prototype of the research subject (numerical model, physical application).
MENG610	Machine Design II	3	The principles of machine design and the design of machine elements. Major emphasis is placed on reliability, fatigue and fracture design using a case study approach. Design topics are selected from bearing lubrication, springs; fasteners, flexible machine elements and power transfer systems (shafts, keys, couplings, and gears).
MENG555L	Introduction To Finite Element Analysis Lab	1	This course teaches students how to effectively construct mechanical model, analyze it, and interpret the results using ANSYS Program. ANSYS is commercial finite-element analysis software with the capability to analyze a wide range of different problems.
MENG555	Introduction To Finite Element Analysis	3	This course covers the fundamentals of the Finite Element Analysis (FEA) with emphasis on solid mechanics and stress analysis. The subject of finite elements is treated using variational principles such as the principle of virtual work and total potential energy. The course deals with a variety of structural components such as springs, axially loaded bars, beams under bending, two-dimensional/axially symmetric/three-dimensional continuum elements and their formulation in static and dynamic analysis.
MENG560	Machine Design I	3	Philosophy of machine Design factor/reliability relationships. Contemporary fatigue design analysis, including low-high cycle fatigue (S-N diagrams and fracture mechanics), triaxial state of non-reversed stress and fatigue damage, surface failure, with applications on design case studies of relatively simple machines.
MENG550	Mechanical Systems II	3	This is the second course which deals with kinematics and dynamics of machinery such as Engine Dynamics, Cams, and Gears. The purpose of this course is to study the kinematics of gear tooth theory, and design gear sets and gear trains for desired motions_tasks. Explore the kinematics and dynamics of cams and followers. Integrate all the dynamic considerations into the design of the slider-crank linkage as used in the single cylinder internal combustion engine piston and pumps. Extend the design to a multi-cylinder engines. It is hoped that this course will help in developing the students' ability to design viable solutions to real, unstructured engineering problems by using a design process.
MENG580	Advanced Heat Transfer	3	Advanced Heat Transfer
MENG530	Mechanical Vibrations II	3	This is a second part of a mechanical vibrations course in which continuous systems are considered rather than discrete systems. Also, the course introduces the various techniques used in vibration control and elimination. Furthermore, the course presents methodologies of vibration testing and experimental modal analysis. Numerical means are employed to discriminate the difference between implicit and explicit techniques used in engineering vibrations. Finally, General forced response is examined for single degree of freedom systems.
MENG525	Engineering Thermodynamics II	3	This is a second part of an engineering thermodynamics course in which properties of gas mixtures, air-vapour mixtures, and applications are considered. Thermodynamics of combustion processes and equilibrium are also studied. Furthermore, Energy conversion, power, and refrigeration are also covered.

MENG520	Fluid Mechanics II	3	This is the second part of a Fluid Mechanics course in which concepts of laminar and turbulent flows around bodies immersed in a fluid stream, boundary layer, lift and drag, and flow separation are considered. Also the course introduces the use of computational fluid dynamics to solve fluid flow problems and its applications to aerodynamics. Derivation of the equations of motion for a compressible viscous fluid flow (Navier -Stokes equation) is also covered in which flow in pipes and ducts, normal shock waves are considered. Furthermore, the course presents elementary engineering estimates of the performance of turbo machines.
MENG510	Stress Analysis	3	Plane stress and plane strain problems, Inelastic axial deformation, inelastic torsion, introduction to membranes, composite beams, curved beams, inelastic bending, shear center, absolute maximum shear stress and strain, theories of failure, fully stressed beams, the secant formula, inelastic bulking, stresses in cylinders, energy methods, Castiglino's theorem, and introduction to plates and shells are covered.
MENG695B	Master Thesis Project(Part II)	3	The Master's Project course is a six credits practical and research course. The master project is spread over two semesters. Students are requested to conduct a research relevant to the field of specialty; ending up with a thesis describing methodology; applications and results. The course also includes the realization of a prototype of the research subject (numerical model, physical application).
MENG501L	Mechanical Engineering Workshop	1	This workshop provides students with hands-on field experience on various aspects of mechanical workshop tools, machining, processes and best practices. As a part of this experience, students will be exposed to: milling processes, lathe machining, electrical welding, drilling, filing and gas welding. Special considerations are given to occupational health and safety standards.
MENG615	Refrigeration & Air conditioning	3	Introduces the Psychrometric properties of air & Psychrometric processes. Thermal Comfort , Estimation of the overall heat transmission coefficients of building sections construction, load calculations and types , types of duct distribution systems, and equipment selection. Introduces duct designing, layout, installing and adjusting of duct systems. Grille & diffuser types & selection .Studies refrigeration theory, characteristics of refrigerants, temperature, and pressure refrigeration systems, system components, compressors, evaporators, metering devices.
MENG615L	Refrigeration & Air conditioning Lab.	1	Refrigeration & Air conditioning Lab
MENG660	Mechanical Engineering Graduate Seminar	1	Acquaints the students with the abilities to search for up-to-date Mechanical Engineering related topics and to address them in a professional atmosphere.
MENG601	Hydraulic and Pneumatic Systems	3	Fundamentals of fluid power technology: hydraulic fluids, hydraulic pipes, pumps, hydraulic cylinders and cushioning devices, motors, valves. Hydraulic circuit design and analysis. Hydraulic conductors and fittings. Ancillary hydraulic devices. Pneumatics: Air preparation, components, circuits and applications. Basic and advanced electrical controls for fluid power circuits. Fluid logic control systems.