| School | |
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| Major | Masters of Science in Mechanical Engineering |

| Major Requirements | | | |
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| **Code** | **Title** | **Credits** | **Description** |
| MENG695A | Master Thesis Project(Part I) | 3 | The master thesis project is a six credits research and application course that spans over two semesters. Students are expected to develop a theoretical or an applied model in their respective field of specialization. Students should write a thesis describing the research methodology, implementation and results. The developed model might be a valid numerical simulation, a well-functioning prototype or a well-supported mathematical or scientific model. |
| MENG610 | Machine Design II | 3 | This course covers 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 | ANSYS is commercial finite-element analysis software with the capability to analyze a wide range of different problems. This course teaches students how to effectively construct mechanical model, analyze it, and interpret the results using ANSYS program. |
| 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 safety factor/reliability relationships. Contemporary fatigue design analysis, including low-high cycle fatigue (S-N diagrams and fracture mechanics), tri-axial state of non-reversed stress and fatigue damage, surface failure with applications on design case studies of relatively simple machine parts |
| MENG550 | Mechanical Systems II | 3 | This course deals with kinematics and dynamics of machinery such as engine dynamics, cams, and gears. The purpose of this course is to understand the gear tooth theory, and design gear sets and gear trains for desired motions or tasks. Identify the kinematics of cams and followers. Apply all the dynamic considerations into the design of the slider-crank linkage as used in the single cylinder internal combustion engine piston and pumps and extend the design to multi-cylinder engines. |
| MENG580 | Advanced Heat Transfer | 3 | This course covers advanced heat transfer calculations related to two-dimensional conduction, free convection correlations, heat exchangers, radiation heat exchange, solar energy, and heat recovery. |
| MENG530 | Mechanical Vibrations II | 3 | Analysis of the vibration of discrete systems under general arbitrary forced excitation. Elimination or reduction of the unwanted vibrations through isolators or absorbers.Study of the vibrations of continuous systems rather than discrete systems. Effects of the boundary conditions on the solution of such systems. |
| MENG525 | Engineering Thermodynamics II | 3 | This is the second part of an engineering thermodynamics course including more applications. Properties of gas mixtures, air-vapor mixtures, and applications are considered. Vapor and gas power plant, and refrigeration systems are covered. Furthermore, thermodynamics of combustion processes and equilibrium are also studied. |

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| 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. The course also 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 equations) is also covered in which flow in pipes and ducts, normal shock waves are considered. Furthermore, the course presents elementary engineering estimates of the theory of turbo-machines. |
| MENG510 | Stress Analysis | 3 | This course covers 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, Castigliano's theorem, and introduction to plates and shells are covered. |
| MENG695B | Master Thesis Project(Part II) | 3 | The master thesis project is a six credits research and application course that spans over two semesters. Students are expected to develop a theoretical or an applied model in their respective field of specialization. Students should write a thesis describing the research methodology, implementation and results. The developed model might be a valid numerical simulation, a well-functioning prototype or a well-supported mathematical or scientific model. |
| 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 safety and health standards. |
| MENG615 | Refrigeration & Air conditioning | 3 | This course covers psychrometric air properties and processes, heating, ventilating and air conditioning systems, thermal comfort, overall heat transmission coefficients of building structures, load calculations and types, types of duct distribution systems, and equipment selection. Duct designing, layout, installation and adjustment will also be discussed. Grille and diffuser types and selection, refrigeration theory, charcateristics of refrigerants, temperature and pressure refrigeration systems, system components, compressors, evaporators, and metering devices will be introduced and explained. |
| MENG615L | Refrigeration & Air conditioning Lab. | 1 | This course lab covers the determination of power input, heat output, coefficient of performance, and estimation of the effect of compressor pressure ratio on volumetric efficiency in the mechanical heat pump, also the refrigeration cycle is investigated by extracting the temperature-pressure relationship and performance of refrigeration under different heat source and heat sink temperatures.<br>The water chiller training unit is experimented with by measuring and tracing the enthalpy cycle and performing power calculations. In addition, the thermoelectric heat pump is covered by the investigation of the Peltier effect, Thomson or Lenz effect, and Seebeck effect.<br>The investigation of air conditioning by constructing a full cycle diagram and balancing the refrigerant system energy is covered as well as the investigation of pressure losses in the air conditioning unit elements and the determination of the k-factor for the pressure loss. |
| MENG660 | Mechanical Engineering Graduate Seminar | 1 | The Mechanical Engineering Graduate Seminar is designed to acquaint the students with the abilities to search for up-to-date Mechanical Engineering related topics and to address them in a professional atmosphere. Students are expected to improve oral and written communication skills. |

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| MENG601 | Hydraulic and Pneumatic Systems | 3 | This course introduces the concept of fluid power technology such as hydraulic and pneumatic systems. It Emphasizes on basic theories, components sizing, construction and function, how to read pneumatics and fluid power circuit diagrams using the correct symbols and troubleshooting techniques. |