

# MECHANICAL ENGINEERING (ENGM)

## ENGM 299 Internship 0 Credit Hour(s)

**Offered:** Resident

## ENGM 304 Instrumentation and Measurements 3 Credit Hour(s)

**Prerequisite:** (MATH 234 or MATH 334) and ENGR 110 and MATH 231 and PHYS 232

This course focuses on the essentials of instrumentation, measurements, and experimental methods used in mechanical engineering. It introduces students to instruments like rulers, calipers, and micrometers, as well as more sophisticated devices such as strain gauges, load cells, and accelerometers. The curriculum includes practical labs and projects that simulate real-world engineering scenarios, including designing and building electronic circuits, using various sensors for dynamic and static measurements, and developing proficiency in soldering and oscilloscope operations.

**Offered:** Resident

## ENGM 310 Materials Engineering 3 Credit Hour(s)

**Prerequisite:** (ENGR 110 or ENGR 115) and CHEM 121 and MATH 131 and MATH 132 and PHYS 231

A study of the atomic and molecular structure of materials and the effects on their various properties and applications. It provides understanding of how the microstructure composition of materials can be tailored to desired mechanical, electrical, optical, magnetic, and even smart properties. Emphasis is placed on the four most common categories of engineering materials: metals, plastics, ceramics, and composites. It also provides a survey on the abundance, selection, design, manufacturing, and designation of engineering materials.

**Offered:** Resident

## ENGM 350 Computer-Aided Engineering 3 Credit Hour(s)

**Prerequisite:** (MATH 234 or MATH 334) and ENGR 110 and ENGR 240 and MATH 231

This course emphasizes on creative design, application of physical laws, and hands-on virtual or physical projects. Review of kinematics/dynamics of commonly used planar mechanisms and programming techniques for motion simulation. Interdisciplinary projects will be assigned to assess students' design knowledge. Application of computer-aided techniques to the analysis of engineering problems utilizing governing equations of the systems. Students will be exposed to formulations of finite element methods of analysis. Emphasis is placed on practical aspects of structural FE.

**Offered:** Resident

## ENGM 375 Thermal Fluids Design Lab 2 Credit Hour(s)

**Prerequisite:** PHYS 320 and ENGR 315 and ENGR 360

To reinforce key concepts of thermal-fluid sciences and introduce thermal-fluids system design. To equip students to design and carry out experiments related to thermal-fluids systems, to analyze data, and report results in a professional manner. Students learn to operate equipment such as heat exchangers, centrifugal pumps, ducts and fittings, compressors, refrigerators, valves, dampers, etc. Additionally, students are introduced to thermal-fluids systems in nature. (Formerly ENGM 325)

**Offered:** Resident

## ENGM 415 Design of Machine Components 3 Credit Hour(s)

**Prerequisite:** ENGR 330

To provide common analytical approaches to design a wide variety of machine components. It emphasizes the engineering mechanics topics of failure theory and analysis. It provides reinforcement of finite element method and computer-aided engineering as techniques and tools to aid machinery design. Topics include: Cam design and analysis; static and fatigue failure theories; surface failure; shafts, keys, and couplings; bearings and lubrication; spur, helical, bevel and worm gears; spring design; screws and fasteners; clutches and brakes. (Formerly ENG 355)

**Offered:** Resident

## ENGM 445 Material and Manufacturing Processing 4 Credit Hour(s)

**Prerequisite:** ENGM 310

To introduce the physical fundamentals of manufacturing processes; with emphasis placed on those physical principles that are common to several, apparently unrelated, processes. Students learn material selection and processes, especially for metals, plastics, ceramics, and composites. Topics include: geometric attributes of manufactured parts, service attributes of manufactured products, materials in design and manufacturing, machining and nontraditional machining processes, joining processes, surface treatments, manufacturing of semiconductor devices, manufacturing systems, and dynamics of manufacturing in a globalized economy.

**Offered:** Resident

## ENGM 481 Mechanical Engineering Design I 3 Credit Hour(s)

**Prerequisite:** (ENGR 320 or PHYS 320) and (MATH 234 or MATH 334) and ENGI 220 and ENGR 210 and ENGR 235 and ENGR 240 and ENGR 270 and ENGR 315 and ENGR 330 and ENGR 360 and ENGR 385 and MATH 131 and MATH 132 and MATH 231 and PHYS 231 and PHYS 232

This is the first senior design course where students are exposed to engineering design and product/process development. Students work in teams on engineering design projects from inception to completion to satisfy the needs and requirements of the clients. In addition to technical design, factors such as safety, economics, and ethical and societal implications are considered.

**Note:** ENGM 481 and ENGM 482 represent two parts of the same project; therefore, they must be taken in consecutive terms.

**Offered:** Resident

## ENGM 482 Mechanical Engineering Design II 3 Credit Hour(s)

**Prerequisite:** ENGM 481

This is the second senior design course where students are exposed to engineering design and development. Design process culminates in prototype manufacturing, testing and validation, design improvement, producing a successful prototype/process/set of design plans and specifications, and presenting to peers, clients, and faculty members.

**Note:** ENGM 481 and ENGM 482 represent two parts of the same project; therefore, they must be taken in consecutive terms.

**Offered:** Resident

## ENGM 499 Internship 1-6 Credit Hour(s)

**Offered:** Resident