

Suggested Courses for ME Students Interested in Machine Design

Technical Electives:

A limit of 6 credits of List #2 technical electives can be used to satisfy the 15 credits of technical electives required to earn a BSME degree. There is no limit in List #1 technical electives. Be sure to consult the current list of approved technical electives for the year in which you plan to graduate to make sure the courses listed below are valid technical electives.

List #2 Technical Electives:

BSE 2484 – Engines and Power Trains (3 credits)

Fundamentals of the construction and operation of current internal combustion power units. Control of power utilizing clutches, transmissions, drive shafts, and differentials. Pre: MATH 1016 or MATH 1025. NO FORCE ADDS.

List #1 Technical Electives:

ESM 3054 (MSE 3054): Mechanical Behavior of Materials (3 credits)

Mechanical properties and behavior of engineering materials subjected to static, dynamic, creep and fatigue loads under environments and stress states typical of service conditions; biaxial theories of failure; behavior of cracked bodies; microstructure-property relationships and design methodologies for homogeneous and composite materials. Pre: ESM 2204 and MSE 2034 or MSE 2044 or MSE 3094 or AOE 3094 or CEE 3684.

ESM 3064 (MSE 3064): Mechanical Behavior of Materials Laboratory

Laboratory experiments on mechanical properties and behavior of homogenous and composite engineering materials subjected to static, dynamic, creep, and fatigue loads; behavior of cracked bodies; microstructure-property relationships, and determination of materials properties for use in engineering design. Pre: 2204. Co: 3054. (3L,1C)

ESM 3124: Intermediate Dynamics. Fall only.

Vector analysis, Newton's Laws, rotating coordinate systems, particle dynamics, orbital mechanics, systems of particles, rigid-body dynamics, inertia matrix, Eulerian angles, introduction to gyroscopic motion, Lagrange's equations. Pre: 2304, (MATH 2214 or MATH 2214H), (MATH 2224 or MATH 2224H). (3H,3C)

ESM 3154: Solid Mechanics. Spring only.

Definition of strain and stress, consideration of balance of mass, momentum, energy and constitutive behavior; deformation of solid objects: 3D wave equation for bulk modes; plane stress; plane strain and axisymmetry; asymmetrical bending and shear center; torsion of general cross-section bars. Pre: 2204. (3H,3C)

ESM 4024: Advanced Mechanical Behavior of Materials. Spring only.

Mechanical behavior of materials, emphasizing solid mechanics aspects and methods for predicting strength and life of engineering components. Plasticity, failure criteria, fracture mechanics, crack growth, strain-based fatigue, and creep. Microstructure-property relationships, and laboratory

demonstrations. Pre: 3054 or MSE 3054. (3H,3C)

ESM 4044: Mechanics of Composite Materials. Fall only.

Introduction to the deformation, stress, and strength analysis of continuous-fiber-polymer-matrix laminated composites. Fabrication, micromechanics of stiffness and expansional coefficients, classical lamination theory (CLT). Environmentally induced stresses. Computerized implementation and design. Pre: 2204. (3H,3C)

ME 3604 – Kinematics & Dynamics of Machinery (3 credits) Spring only.

Kinematic analysis and design of cams, gears, and linkages, velocity, acceleration and force analysis, kinematic synthesis, balancing, kinematic and force analysis by complex numbers, computer-aided analysis, and synthesis of linkages. Pre: ESM 2304.

ME 4524 – Introduction to Robotics and Automation (3 credits) Spring only.

Automation, robot technology, kinematics, dynamics, trajectory planning, and control of two-dimensional and spatial robots; robot programming; design and simulation of robotic devices. Pre: ME 3514 and STAT 3704. Graduating seniors only.

ME 4624 – Finite Element Practice in Machine Design (3 credits) Fall only.

Application of the finite element method to stress analysis problems in mechanical design. Modeling techniques, proper use of existing computer programs, interpreting of results, application to design modification. Pre: ME3614.

ME 4634 – Intro Computer-Aided Design and Manufacture (3 credits) Spring only.

Participants will study the computer-aided design and manufacturing of mechanical systems. A mechanical system will be designed including preliminary design, analysis, detail design, numerical control programming, and documentation. Applications programs will be written and interfaced to the CAD/CAM database. All assignments will be carried out on a CAD/CAM system. This course cannot be taken Pass/Fail.

ME 4644 – Rapid Prototyping (3 credits) Spring only.

Participants will study topics fundamental to rapid prototyping and automated fabrication, including the generation of suitable CAD models, current rapid prototyping fabrication technologies, their underlying material science, the use of secondary processing, and the impact of these technologies on society. The rapid prototyping process will be illustrated by the actual design and fabrication of a part. Programming skills required. Co: ME4634. This course may not be taken P/F. Graduating Seniors only.

ME 4664 – Intro Global Collaborative Engineering Design (3 credits) Fall only.

Participants will study topics fundamental to global collaborative engineering design, product data management, and collaborative product data management. These topics will be applied during a team project with team members located overseas, utilizing state-of-the-art collaborative engineering and product data management software and hardware technologies. Partially duplicates 5664. Credit may only be received for one course. Pre: ME2024, ME4634.

ME 4735: Mechatronics (3 credits) Fall only.

Electromechanical system modeling, control and applications. Design and building of electronic interfaces and controllers for mechanical devices, sensors, signal acquisition, filtering, and conditioning. Microcontroller-based closed-loop control and device communications. Sensor and

actuator selection, installation, and application strategies are studied. Pre: ECE 3254, ME 3514 or ECE 2004, and ECE 2704. Cannot be taken P/F.

ME 4736: Mechatronics (3 credits) Spring only.

Electromechanical system modeling, control and applications. Design and building of electronic interfaces and controllers for mechanical devices, sensors, signal acquisition, filtering, and conditioning. Microcontroller-based closed-loop control and device communications. Sensor and actuator selection, installation, and application strategies are studied. A term design project is a key component to this course. Pre: ME 4735. Cannot be taken P/F.

** courses in grey have not been taught for at least one academic year and may not be available*