

Suggested Courses for ME Students Interested in Robotics

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 #1 Technical Electives:

ISE 4264 – Industrial Automation (3 credits) Spring only.

A survey of the various technologies employed in industrial automation. This includes an emphasis on industrial applications of robotics, machine vision, and programmable controllers, as well as an investigation into problems in the area of CAD/CAM integration. Examination of the components commonly employed in automation systems, their aggregation and related production process design. Laboratory work is required. Must also enroll in lab section. Pre C- or better in: ISE2204 or ISE2214.

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: ECE 2574/STAT 4714 (or ME 3514), and STAT 3704.

ME 4614: Mechanical Design II (3 credits) Spring only.

Design of mechanical elements such as welded joints hydrodynamic bearings, spur gears, shafts, brakes. Alternative fatigue design methods, cumulative fatigue, mechanical design computer software. Pre: ME 3614.

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. Graduating Seniors only.

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 may not be taken Pass/Fail.

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

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: 4735. This course cannot be taken Pass/Fail.

ME 4864: Micro/Nano-Robotics (3 credits) Fall only.

Overview of Micro/Nano-robotic systems. Physics of reduced length scales (scaling effects in the physical parameters, surface forces, contact mechanics, and micro/nano-scale dynamical phenomena), Basics of micro/nano-manufacturing, microfabrication and soft lithography, Biomimetic design strategies for mobile micro-robots, Principle of transduction, material properties and characteristics of Micro/nano-actuators (piezoelectric, shape-memory alloy, and a variety of MEMS and polymer actuators), Control requirements and challenges of micro/nano-actuators, Micro/nano sensors for mobile microrobotic applications, Micro/nano-manipulation (scanning probe microscopy, operation principles, designing experiments for nanoscale mechanical characterization of desired samples). Pre: MATH 2214, ME 3404, ME 3514.

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