Mechanical and Industrial Engineering

220 Engineering Lab

Degrees: Bachelor of Science in Mechanical Engineering
Bachelor of Science in Industrial Engineering

Contact: James R. Rinderle,
Undergraduate Program Director
Office: 207C Engineering Lab Building
Phone: 545-2505

Head of Department: Distinguished Professor
Stephen Malkin. Professors Amb, Blake, Chait, Danai, Donovan, Fisher, Goldstein, Jakus, Kim, Malkin, McGowan, Poli, Smith; Associate Professors Deshmukh, Gao, Grosse, Krishnamurty, Nair, Rinderle; Assistant Professors Baker, de Bruyn Kops, Hyers, Muriel, Perot, Rothstein, Schmidt, Terpenny; Adjunct Professors Ali, Enghagen.

The Majors

The department offers undergraduate degree programs that lead to the B.S. in Mechanical Engineering and the B.S. in Industrial Engineering. The educational objectives of the curriculum are to develop engineers who can practice their mechanical and industrial engineering profession in business, organizational, societal, and ethical contexts. Graduates exhibit the characteristics associated with professional engineering practice, and understand how a mechanical or industrial engineer fits into an organization and how that organization fits into the global and societal context. They are able to design and conduct effective and efficient engineering experiments and interpret the results; to recognize, solve, and manage mechanical or industrial engineering problems; to communicate effectively at all appropriate organizational levels (e.g., technical, financial, shop floor, in teams); and to recognize and deal with change. Graduates of the programs understand the implications of product/process/life cycle decisions and the relationships between mechanical and industrial design and realization.

The freshman year curricula in Mechanical Engineering and Industrial Engineering are identical. The sophomore year curricula are nearly identical. During the junior and senior years, students select required and elective courses relevant to their chosen majors.

Admission to the Majors

To be admitted to either major, a student must complete, with a grade of C or better, all of the seven technical courses in the freshman year: MATH 131 and 132; ENGIN 110 or 111 or 112 or 113; CHEM-ENG 120 or CE-ENGIN 121 or E&C-ENG 122 or M&E-ENGR 124; CHEM 111; and PHYSICS 151 and 153. A cumulative grade point average of 2.0 is also required. Students not admitted to a specific engineering discipline can register for junior level M&I-ENG courses at the 300 level or above.

Requirements

In addition to the requirements listed below, students must also satisfy the College of Engineering core requirements and the University graduation requirements.

Mechanical and Industrial Engineering Majors

201 Introduction to Materials Science
210 Statics
211 Strength of Materials
213 Introduction to Mechanical and Industrial Engineering Design

273 Basic Probability and Statistics for Engineers
375 Manufacturing Processes
MATH 233 Multivariate Calculus
MATH 331 Differential Equations

Mechanical Engineering Majors

230 Thermodynamics I
302 Mechanical Engineering Laboratory I
310 Dynamics
313 Design of Mechanical Components
340 Fluid Mechanics I
354 Heat Transfer
395 Professional Seminar
E&C-ENG 361 Fundamentals of Electrical Engineering
397B Dynamic Systems Modeling, Analysis and Simulation
402 Mechanical Engineering Laboratory II
413 Design of Mechanical Assemblies
444 Mechanical Engineering Automatic Controls
497E Thermo-Fluid Design
Senior design elective: 415 Design of Mechanical Systems or 497A Design Against Failure

Two Engineering Design or Engineering Science electives:


Technical elective: One 3-credit M&E-ENG course at the 300 level or above

Industrial Engineering Majors

353 Engineering Economic Decision Making
373 Introduction to Simulation Methods
379 Deterministic Operations Research
390M Stochastic Operations Research
E&C-ENG 361 Fundamentals of Electrical Engineering or E&C-ENG 242 Data Structures and Algorithms
422 Statistical Quality Control
460 Human Factors Engineering I
477 Production Planning and Control
478 IE Capstone Design
492 Senior Seminar
MATH 235 Introduction to Linear Algebra
Five technical electives: choose from 3-credit M&E-ENG courses at the 300 level or above, except 520 and 586. Only one of 585 or 587 may be used toward this requirement. Other engineering courses may be chosen with the consent of the department’s Undergraduate Committee.
ECON 104 Introduction to Macroeconomics
Free Elective: Any 3-credit course other than one which is a prerequisite for a required IE course.
Additional Requirement
To achieve their educational objectives, the curricula include elements related to engineering fundamentals, engineering problem solving, professional responsibility, experimentation, communication, and design. Some courses include more than one required element of the curriculum, e.g., M&I-ENG 213 includes both technical elements of design and communication skills. Students must pass all required elements of all required courses. Students who pass a course but not all required elements of the course are notified in writing of their failure. In such cases, the course instructor and the undergraduate program director will specify a remediation program.

Students in both degree programs are required to complete a senior exit survey.

Course Prerequisites
All students must meet the stated prerequisites for a course or obtain permission of the instructor. Students are responsible for their failure to meet prerequisites. Students may be dropped from any course for which they have not met the prerequisites and, in the instructor’s opinion, do not have adequate preparation.

Curriculum Modification
Students who wish to modify either the ME or IE curriculum to satisfy their needs must have written prior approval from the MIE undergraduate committee for all changes.

Honors Program
Both the ME and the IE programs support a departmental honors program. Information on the Honors Program can be found in the Commonwealth College section in this catalog. Students interested in the departmental honors program should contact the undergraduate program director.

The Courses
(All courses carry 3 credits unless otherwise noted.)

124 Computational Approaches to Engineering Problems (2nd sem)
201 Introduction to Materials Science (both sem)
210 Statics (both sem)
211 Strength of Materials I (both sem)
213 Introduction to Mechanical Design (both sem)
230 Thermodynamics I (both sem)
273 Basic Probability and Statistics (both sem)
302 Mechanical Engineering Laboratory I (both sem)
310 Dynamics
313 Design of Mechanical Components (both sem)
340 Fluid Mechanics I
353 Engineering Economic Decision Making
354 Heat Transfer
373 Introduction to Simulation Methods
375 Manufacturing Processes
379 Deterministic Operations Research
390M Stochastic Operations Research
395 Professional Seminar (2nd sem) 1 cr
397B Dynamic Systems Modeling, Analysis and Simulation
402 Mechanical Engineering Laboratory II (both sem) 4 cr
411 Strength of Materials II
413 Design of Mechanical Assemblies (both sem)
414 Computer-Aided Mechanical Design
415 Design of Mechanical Systems I
418 Design of Mechanisms
422 Statistical Quality Control
440 Aerospace Fluid Mechanics
444 Mechanical Engineering Automatic Controls
460 Human Factors Engineering I
477 Production Planning and Control
478 IE Capstone Design (2nd sem)
485 Vibrations
492 Senior Seminar (1st sem)
497 Special Topics
497A Design Against Failure
497E Thermal-Fluid Design
520 Probability and Statistics for Engineers
532 Network Optimization
544 Layout and Design of Industrial Facilities
545 Information Systems in a Manufacturing Environment
546 Safety Engineering
551 Thermal Environmental Engineering (not offered '03-'04)