

(d) An advisor will assist students in selecting any additional courses that may be required to meet the baccalaureate degree requirements of 128 credits with at least 54 credits in upper division (junior or senior level) courses. Information and Communication Technology majors must comply with all New Mexico State University, College of Engineering, and Department of Engineering Technology requirements for the baccalaureate degree as specified in the relevant sections of this Catalog.

MINOR: Manufacturing

A student must pass 18 credits with a grade of C or higher as outlined below. No courses may be taken S/U.

ET 110 Introduction to Computer-Aided Drafting and Design or ME 159, Graphical Communication and Design or similar approved course; ET 217/217L or IE 217/217L, Manufacturing Processes/Laboratory; ET 415, Manufacturing Management & Productivity or IE 316, Methods Engineering or ET 309G, Manufacturing: History and Technology; ET 305, Design for Manufacturing or IE 424, Production and Inventory Control12

One of the following: ET 404, Quality in Manufacturing; IE 310G, Continuous Quality Improvement; IE 365, Quality Control; or MGT 345, Operations Planning and Control3

ET 482 or IE 482, Concepts in Computer Integrated Manufacturing I3

Note: Students in the College of Engineering cannot use ET 309G as a technical elective or to meet Viewing Wider World General Education requirements.

MINOR: Security Technology and Intelligence Studies

A student must pass 18 credits with a grade of C or higher as outlined below. No courses may be taken S/U. A student must register in the minor before enrolling in any upper division Criminal Justice courses.

- All students must complete the following: ET/ICT 456, Analysis of Physical Security Systems3
- Any two C J courses from the following: CJ 321, Criminal Investigation and Intelligence; CJ 412, Introduction to Security Technology and Loss Prevention; CJ 425, Ethics in Criminal Justice6
- One of the following ET courses: ET/ICT 457, Introduction to Information Security; ET/ICT 458, Database Design and Application3
- Any two courses from the following, or any courses listed in #2 and #3 not completed: CJ 322, Organized Crime; CJ 411, Nature of Crime; CJ 432, Issues in Criminal Justice to be Approved by CJ Department Head; CJ 480, Criminal Justice Planning & Crime Analysis; CJ 483, Terrorists CJ 484, Hate Crimes & Domestic Terrorism; ET/ICT 339, Computer Forensics; ET/ICT 377, Computer Networking (for use by students not majoring in ETE); ET/ICT 490, Selected Topics to be Approved by ET Department Head6

Three upper division CJ courses may meet 3 of the 6-credit Viewing a Wider World requirements for students majoring outside of the College of Arts and Sciences. Three upper division ET courses may meet 3 of the 6-credit Viewing a Wider World requirements for students majoring outside of the College of Engineering.

INDUSTRIAL ENGINEERING

Associate Professor Edward Pines, department head

Associate Professors Cecil, Mullen, Pines; **Assistant Professors** Sohn, Valles-Rosales; **College Associate Professor** Green
(505) 646-4923

DEGREE: Bachelor of Science in Industrial Engineering

Industrial engineers design, develop, install and improve integrated systems of people, equipment, information, financial resources, software, materials, and energy. Industrial engineers work in a variety of manufacturing, health care, utility, retail, government and research settings, therefore the tools and methods of the industrial engineer are both varied and broad. They use knowledge and skills in engineering, mathematics, and physical and social sciences along with the principles and methods of engineering analysis and design to monitor and improve such systems. New Mexico State University's undergraduate degree program in Industrial Engineering prepares students to

join the work force or pursue graduate education while setting the foundation for life-long learning.

Specifically, graduates of the program will be:

- able to apply various industrial engineering techniques in an integrated fashion to solve real world problems in process design and/or improvement;
- able to obtain meaningful employment or enroll in a graduate program; and
- prepared for a long-term, successful career sustained by life-long learning experiences.

In addition, the Accreditation Board of Engineering and Technology Engineering Criteria 2000, in conjunction with the Institute of Industrial Engineers, requires that:

- baccalaureate degree graduates will be able to demonstrate the ability to design, develop, implement and improve integrated systems that include people, materials, information, equipment and energy;
- industrial engineering curriculums include in-depth instruction allowing students to accomplish the integration of systems using appropriate analytical, computational and experimental practices; and
- that faculty teaching in industrial engineering departments show evidence of understanding professional practice and maintain currency in their respective professional areas. Program faculty must have responsibility and sufficient authority to define, revise, implement, and achieve program objectives.

Requirements (Total credits 133)

In addition to the university requirements for graduation, a student must have a 2.0 grade-point average in all departmental courses and take the Fundamentals of Engineering Examination prior to graduation.

Freshman Year (33 credits)

| | |
|--|---|
| CHEM 111, General Chemistry I..... | 4 |
| ENGL 111G, Rhetoric and Composition..... | 4 |
| IE 110, Industrial Engineering Orientation..... | 1 |
| IE 151, Computational Methods in Industrial Engineering I..... | 3 |
| IE 152, Introduction to Industrial Engineering..... | 2 |
| MATH 191, 192, Calculus and Analytic Geometry I, II..... | 6 |
| ME 159, Graphical Communication and Design..... | 2 |
| PHYS 215, Engineering Physics I..... | 3 |
| PHYS 215L, Engineering Physics I Lab..... | 1 |
| Approved general education elective: Literature and Fine Arts**..... | 3 |
| Science elective*..... | 4 |

Sophomore Year (33 credits)

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|--|---|
| C E 233, Mechanics-Statics, or M E 236, Engineering Mechanics I..... | 3 |
| ECON 251G, Principles of Macroeconomics..... | 3 |
| IE 217, Manufacturing Processes..... | 2 |
| IE 217L, Manufacturing Processes Lab..... | 1 |
| IE 311, Engineering Data Analysis..... | 3 |
| IE 351, Computation Methods in Industrial Engineering II..... | 3 |
| MATH 291 Calculus and Analytic Geometry III..... | 3 |
| PSY 201G, Introduction to Psychology..... | 3 |
| Engineering science elective*..... | 6 |
| Math elective* (Linear Algebra)..... | 3 |
| Science elective*..... | 3 |

Junior Year (33 credits)

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|---|---|
| ACCT 251, Management Accounting..... | 3 |
| CH E 361, Engineering Materials..... | 3 |
| ENGL 218G, Technical and Professional Communication..... | 3 |
| IE 316, Methods Engineering..... | 3 |
| IE 365, Quality Control..... | 3 |
| IE 467, Simulation Modeling..... | 4 |
| MATH 392, Differential Equations..... | 3 |
| Math elective*, upper-division..... | 3 |
| Engineering elective*..... | 3 |
| Approved general education elective: Historical Perspectives**..... | 3 |
| Approved general education elective: Viewing a Wider World†..... | 3 |

Senior Year (33 credits)

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|---|---|
| COMM 265G, Principles of Human Communication..... | 3 |
| IE 413, Engineering Operations Research I..... | 3 |
| IE 423, Engineering Operations Research II..... | 3 |

I E 424, Manufacturing Systems3
 I E 451, Engineering Economy3
 I E 460, Evaluation of Engineering Data3
 I E 478, Facilities Planning and Design.....3
 I E 480, Senior Design3
 Engineering electives*6
 Approved general education elective: Viewing a Wider World†3

*A detailed list of approved electives is available in the Department of Industrial Engineering.
 **The catalog section "General Education Courses and Requirements" includes a list of approved electives.
 ***A two-course sequence in either physics or chemistry is required.
 †A detailed list of approved WWW electives is available in the Department of Industrial Engineering. Students should choose WWW electives that meet the ABET humanities and social science requirements.

- to develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information, and to work collaboratively;
- to teach students to use modern experimental and data analysis techniques; and
- to instill in our students an understanding of their professional and ethical responsibilities.

Graduation Requirements

In addition to the NMSU requirements for graduation, a student must obtain a minimum grade of C in mechanical engineering courses.

Requirements (Total credits 129)

Freshman Year (32 credits)

CHEM 111, General Chemistry I, and CHEM 112, Chemistry II8
 ENGL 111G, Rhetoric and Composition4
 ENGL 218G, Technical and Scientific Communication3
 MATH 191, 192, Calculus and Analytic Geometry I, II6
 M E 102, Mechanical Engineering Orientation1
 M E 159, Graphical Communication and Design2
 M E 166, Introduction to Mechanical Engineering2
 M E 222, Product Development/ Laboratory3
 Approved General Education Literature and Fine Arts elective3

Sophomore Year (33 credits)

C E 301, Mechanics of Materials3
 COMM 265G, Principles of Human Communication3
 E E 201, Networks I3
 MATH 291, Calculus and Analytic Geometry III3
 MATH 392, Differential Equations3
 M E 236, Engineering Mechanics I3
 M E 237, Engineering Mechanics II3
 M E 240, Thermodynamics3
 M E 260, Mechanical Engineering Problem Solving3
 PHYS 215, Engineering Physics I3
 PHYS 216, Engineering Physics II3

Junior Year (33 credits)

CH E 361, Engineering Materials3
 ECON 251G, Principles of Macroeconomics, or ECON 252G, Principles of Microeconomics3
 M E 328, Engineering Analysis I3
 M E 338, Fluid Mechanics3
 M E 340, Applied Thermodynamics3
 M E 345, Experimental Methods I3
 M E 329, Engineering Analysis II3
 M E 326, Mechanical Design3
 M E 341, Heat Transfer3
 Approved General Education History elective3
 Approved Mechanics elective*3

Senior Year (31 credits)

M E 425, Design of Machine Elements3
 M E 426, Design Project Laboratory I3
 M E 427, Design Project Laboratory II3
 M E 445, Experimental Methods II3
 M E 449, Mechanical Engineering Senior Seminar1
 Approved General Education Human Thought and Behavior elective3
 Approved General Education Viewing a Wider World elective3
 Approved General Education Viewing a Wider World ECON elective3
 Mathematics elective**3
 Mechanical engineering electives***6

*Mechanics elective must be taken from M E 331, 332, or 333.

**Mathematics electives must be taken from MATH 391, 471, 472, 473, 480, STAT 371, or I E 310.

***Students in their senior year choose 6 credits of M E electives.

MECHANICAL ENGINEERING

Professor Thomas D. Burton, department head

Associate Professor Ronald J. Perderson†, associate department head
 Professors Genin†, Hardee*†, Hills, Smith* (emeritus); Associate Professors Choo, Conley†, Garcia, Leslie, Ma; Assistant Professors Allen, Park, Sevostianov, Shashikanth; College Professors Donaldson*, Hill
 (505) 646-3501

*Registered Professional Engineer (NM)

†Registered Professional Engineer (State other than NM)

DEGREE: Bachelor of Science in Mechanical Engineering

The mechanical engineering program prepares students for a wide range of professional engineering careers in such areas as research and development, design, facilities operation and maintenance, management, and production. Graduates of the program will be prepared to apply engineering sciences, mathematics, computational methods, modern experimental methods, and effective communication skills to problems of interest in industry and government or scholarly topics. Employment opportunities for graduates are extensive. These include energy and utility, manufacturing, automotive, aerospace, defense and space, research and development, and many others. The emphasis in the curriculum is on engineering sciences (solid mechanics, thermal sciences, fluid mechanics, and materials science), mathematics, engineering analysis, engineering design, general sciences, and communication balanced with general education topics and electives. Graduates of the program will also be prepared for graduate studies (subject to grade-point and standardized test qualifications). Students will be prepared to take the fundamentals of engineering examination (and are encouraged to do so) as a step towards professional registration.

Mechanical Engineering Educational Goals and Objectives

The goals of the Department of Mechanical Engineering, as set forth in the departmental strategic plan, are:

- to educate those who will advance knowledge and become the future leaders of industry and academia;
- to conduct both basic and applied research in mechanical engineering and related interdisciplinary areas; and
- to provide service to the profession, to the State of New Mexico, to the country, and to the future development of engineering world wide.

A critical focus within the department is to afford undergraduates of varying backgrounds and abilities every opportunity for achieving success in the mechanical engineering profession. To address this focus, the faculty of the mechanical engineering department, with input from other constituents, have established the following educational objectives for the undergraduate program:

- to prepare students for successful careers and lifelong learning;
- to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems;