

in the humanities and social sciences is required of each graduate. A listing of specific courses which may be used to satisfy the humanities and social sciences requirements is available in each department. At least 18 credits of humanities and social sciences are required for the bachelors degrees. It is expected that the courses will be selected in such a manner as to provide a coherent body of study in one or more areas and to satisfy the general education requirements of the university.

S/U Coursework

The College does not allow engineering, science, mathematics, communications and technical writing coursework graded S/U to count toward the degree requirements except for those courses specifically designated in the undergraduate catalog as S/U by the departments. Qualified students may take humanities and social science courses under the S/U option.

Math Placement

Entering freshmen are placed into an appropriate math course based upon the results of the Math Placement Exam administered regularly by the NMSU mathematics department. Students with Advanced Placement or transfer credit for mathematics will be placed accordingly. Math placement may be altered at the discretion of the associate dean.

Minors

The College of Engineering offers minors in agricultural engineering, computer engineering, environmental engineering, surveying, electrical engineering, manufacturing, security technology and intelligence studies, and environmental management. The surveying minor is administered by the Department of Surveying Engineering, the security technology and intelligence studies minor is jointly administered by the Departments of Criminal Justice and Engineering Technology. The agricultural engineering and environmental engineering minors are administered by the Department of Civil Engineering. The manufacturing minor is administered by the Department of Engineering Technology. The computer engineering and electrical engineering minors are administered by the Klipsch School of Electrical and Computer Engineering. Students majoring in engineering may also earn minors in other colleges.

Minor: Environmental Management (18 credits)

The environmental management minor is an interdisciplinary program administered by WERC: A Consortium for Environmental Education and Technology Development located in Engineering Complex III.

Requirements: (all courses must be completed with a grade of C or higher. No courses may be taken S/U.)

1. One of following (3 credits): WERC WebCT courses (classes are offered every semester and topics may vary); WERC 300, Introduction to Pollution Prevention and Its Applications; WERC 301, Introduction to Nuclear Energy Technology; WERC 350, Introduction to Energy, Environmental and Risk Assessment; WERC 425, Chemical Hygiene Awareness for New Mexico Schools; WERC 490, Special Topics.....3
2. Any two of the following (3 credits): WERC 330, Environmental Management Seminar I (or equivalent); WERC 430, Environmental Management Seminar II (or equivalent); WERC/ES/ET 312, Emergency Response to Hazardous Material Incidents.....3
3. Any four approved environmental management courses (12 credits) 12
Also see <http://www.werc.net/education/Environmental%20course%20requirements.pdf>

ROTC

ROTC students planning to take the advanced military courses leading to a commission as second lieutenant in the Army or the Air Force should discuss their programs with their advisers before the end of the sophomore year. The large number of required engineering courses in the junior and senior years generally make some extension necessary if ROTC is to be included. Taking summer classes between the sophomore and junior year will usually allow sufficient additional time.

Co-op Education

After two semesters of satisfactory academic work (2.5 GPA), an engineering student may go on a work phase with one of the many companies or governmental agencies with which the university has co-op agreements. The experience obtained through alternating periods of academic and fieldwork greatly contributes to the preparation of a student for professional life. Work phases are considered to be a vital part of the educational process, and students are counseled in the selection of co-op positions that will lead to pro-

gressive learning experiences. Earnings while on work phase provide a source of financial assistance to meet educational expenses.

A significant number of undergraduate engineering students are in the cooperative education program. Students may, with the approval of their department head, earn credit while participating in a co-op work phase. Co-op credits do not normally count toward the degree requirements but do show on the transcript.

General Requirements

Students in the College of Engineering are expected to:

- 1) Earn a minimum cumulative grade-point average of 2.0 before enrolling in engineering courses number 200 or above
- 2) Have completed (with a grade of C, or better) the prerequisites for each engineering, technology, math, and science course taken.
- 3) Earn at least a grade of C in all engineering, technology, math and science courses numbered below 200 which are specifically required for the degree.
- 4) Repeat all courses which have not been satisfactorily completed, each semester they are offered.

Requirements for Graduation

The minimum requirements for undergraduate degrees are

- 1) Satisfaction of the university requirements as previously outlined in the "Regulations" section of this catalog.
- 2) Satisfaction of the college requirements as outlined under "General Requirements", above.
- 3) Satisfaction of the departmental rules and course requirements as outlined in the program descriptions later in this catalog.

NOTE: In order to maintain quality, remain current, and satisfy changes in accreditation criteria, requirements which have been published may be changed. Any such changes will be announced and will not be retroactive. Always consult an academic advisor before registering for classes.

General Education requirements were under revision at the time of publication. Students must check with their academic adviser for current requirements and lists of specific courses that meet these requirements.

CHEMICAL ENGINEERING

Associate Professor Martha C. Mitchell*, department head
Professor Richard L. Long*#, associate department head

Professors Long*#, Johnson, Ghassemi, Munson-McGee, Patton (emeritus), Roubicek (emeritus); **Associate Professors** Andersen, Mitchell*, Rockstraw*; **Assistant Professors** Deng; **College Professor** Del Valle
(505) 646-1214

*Registered Professional Engineer (NM)

#Registered Professional Engineer (State other than NM)

DEGREE: Bachelor of Science in Chemical Engineering

Chemical engineers combine their knowledge of science, mathematics, and physics with their expertise in engineering analysis to solve industry-level problems in both the private and public sectors. An undergraduate degree leads to an exciting career in fields such as computer chip manufacturing; environmental restoration and pollution prevention; biotechnology and bio-engineering; pharmaceutical manufacturing; food production; transportation (including automotive and aerospace); advanced materials; petrochemical and refining; chemical synthesis and production; power and energy production (including the nuclear industry); law, medicine or advanced studies at the graduate level.

In support of the mission of New Mexico State University, the Department of Chemical Engineering strives to prepare Chemical Engineering Bachelor of Science graduates to successfully and safely practice the chemical engineering profession, to engage in life-long personal and professional development, and to contribute to the betterment of their community and society.

To accomplish this mission, the department supports the objectives of the college and the university and expands the objectives to satisfy the needs of the Chemical Engineering constituent groups. The department strives to achieve the objectives of providing all graduating B.S. students with:

1. A solid foundation in the fundamentals of chemical engineering science, design, and practice;
2. A sound base in chemistry, mathematics, and physics;
3. An opportunity to explore advanced disciplines pertinent to career choice;
4. An opportunity to participate on multidisciplinary teams;
5. The opportunity and training to develop the written and oral communication skills required of a practicing engineer;
6. The opportunity to develop and comprehend professional and ethical behavior, to develop an understanding of the humanities and social sciences, and to develop the skills to engage in lifelong learning.

These objectives are consistent with those of the College of Engineering and New Mexico State University in their commitment to developing student excellence in an intellectually stimulating environment, cultural diversity, and broad education programs, while encouraging individual expression, professional behavior, civic responsibility, leadership, and an appreciation for continuing education.

The NMSU curriculum meets ABET accreditation requirements.

Requirements (Total credits 131)

In addition to satisfying the requirements of the university and the College of Engineering, all majors must pass departmental courses with a grade of C or better.

Freshman Year (31 credits)

CH E 100, Introduction to Engineering.....	1
CH E 111, Introduction to Computers in Chemical Engineering.....	3
CHEM 115, 116, Principles of Chemistry I, II.....	8
COMM 265G, Principles of Human Communication.....	3
ENGL 111G, Rhetoric and Composition.....	4
MATH 191, 192, Calculus and Analytic Geometry I, II.....	6
PHYS 215, Engineering Physics I.....	3
Humanities or social science elective ¹	3

Sophomore Year (33 credits)

CH E 201, Chemical Process Calculations.....	4
CH E 301, Chemical Engineering Thermodynamics I.....	3
CH E 305, Transport Operations I: Fluid Flow.....	3
CH E 311, Engineering Data Analysis.....	3
CHEM 313, 314, 315, Organic Chemistry I, II, Lab.....	8
ENGL 218G, Technical and Scientific Communication.....	3
MATH 291, Calculus and Analytic Geometry III.....	3
MATH 392, Differential Equations.....	3
PHYS 216, Engineering Physics II.....	3

Junior Year (34 credits)

CH E 302, Chemical Engineering Thermodynamics II.....	3
CH E 306, Transport Operations II: Heat and Mass Transfer.....	3
CH E 307, Transport Operations III: Staged Operations.....	3
CH E 315L, Process Instrumentation Lab.....	2
CH E 361, Engineering Materials.....	3
CH E 407L, Transport Operations Lab.....	2
CH E 441, Chemical Kinetics and Reaction Engineering.....	3
CH E 451, Engineering Economy.....	3
CHEM 434 or CHEM 456, Physical Chemistry elective.....	3
ECON 251G, Principles of Macroeconomics.....	3
Humanities or social science electives ¹	6

Senior Year (33 credits)

CH E 412, Process Control and Dynamics.....	3
CH E 422L, Unit Operations and Process Control Lab.....	2
CH E 452, Process Design, Analysis and Simulation.....	4
CH E 455, Advanced Plant Design.....	2
CH E 490, Senior Seminar.....	1
CH E upper-division elective ²	3
CHEM or natural science elective ³	3
EE 201, Networks I.....	3
ME 236, Engineering Mechanics I.....	3
Engineering elective ⁴	3
Humanities or social sciences electives ¹	6

- ¹ Humanities and social science electives must be selected to satisfy the university's general education requirements.
- ² Upper-division CH E courses with prior approval of your advisor except for CH E 395G.
- ³ Upper-division chemistry or natural science course (such as toxicology or biology) with prior approval of your adviser.
- ⁴ Upper-division engineering course selected with prior approval of adviser.

CIVIL ENGINEERING

Professor Kenneth R. White*, department head

Professor J. Phillip King*, associate department head

Professors Cadena-C,* Hanson*, Idriss*, Jacquez*, Khandan#, Samani*#, White*, Woodward*; Associate Professors Jauregui*, King*, Newton* ; Assistant Professors Bandini, Bawazir, McNamara, Zhang; College Professor Madrid*; Adjunct Professor Hernandez*##
(505) 646-3801

*Registered Professional Engineer (NM)

Registered Professional Engineer (State other than NM)

Registered Land Surveyor (State other than NM)

DEGREE: Bachelor of Science in Civil Engineering

OPTION: General

OPTION: Structures

OPTION: Environmental

OPTION: Geotechnical

OPTION: Water Resources

MINOR: Agricultural Engineering

DEGREE: Bachelor of Science in Civil Engineering

The curricula in civil engineering is designed to provide a broad background and is so arranged that students may specialize in one or more of the options listed above or work in one or more areas of civil engineering in the senior year. Students may elect to obtain more than one option in civil engineering.

Requirements

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

The mission of the Civil Engineering Department is to offer a high quality and accredited degree that prepares our students for professional licensure leading to successful civil engineering careers in industry and government or for success at the graduate level. Toward this end, the Civil Engineering Department will recruit and maintain a diverse, highly skilled faculty that will consistently produce high-end teaching, research, and professional service.

Civil Engineering Program Educational Objectives

In support of the mission, the Civil Engineering Department adopts the following program educational objectives:

1. Prepare our graduates to achieve professional engineering licensure and productivity in a design office setting.
2. Prepare our graduates to be future leaders as public employees and private consultants in civil engineering fields.
3. Have 15% of our graduates pursue and complete a graduate level degree.
4. Maintain and further develop a high quality accredited civil engineering program that is competitive with comparable programs in the southwest and throughout the nation.

In addition, the Accreditation Board of Engineering and Technology, in conjunction with the American Society of Civil Engineers, requires that baccalaureate degree graduates in civil engineering will be able to

- 1) demonstrate proficiency in mathematics through differential equations, probability and statistics, calculus based physics and general chemistry;