

Engineering

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Engineering is defined by the American Society for Engineering Education as "...the profession in which a knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize the materials and forces of nature economically for the benefit of mankind." Consistent with this definition, the College of Engineering prepares individuals for professional careers in engineering research, development, design, operation, or management industry, business, education, and government. This preparation is accomplished through education in a chosen engineering discipline consisting of general education fundamentals and design, mathematics, physical and life sciences, English composition, the arts, humanities, and social sciences. The college also offers a degree in Construction Management that combines technical and business courses to produce construction industry professionals.

The College of Engineering includes seven degree granting departments, the Center for Rotating Machinery, the Hazardous Substance Research Center (South and Southwest), the Louisiana Transportation Research Center, the Louisiana Water Resources Research Institute, and the Gas Turbine Innovation and Energy Research Center. The faculty is actively engaged in design, research, and problem solving in well-equipped facilities for research and teaching. Departments within the college, the various undergraduate curricula, and the degrees that are offered are shown in the chart on the following page.

PROFICIENCY REQUIREMENTS

Mathematical proficiency is essential to engineers and to engineering education. Accordingly, students who plan to study engineering should schedule all appropriate mathematics courses available to them in high school. Placement tests are given to all incoming freshmen, and those who do not qualify to begin university mathematics at the level prescribed in the freshman engineering program cannot expect to complete requirements for a degree in the nominal length of time. Credit for mathematics courses preliminary to analytical geometry and calculus may not be applied toward the engineering degrees in the College of Engineering.

Proficiency in college-level mathematics and physics is essential to successful completion of upper-division engineering courses. Engineering students must earn a minimum grade of "C" in MATH 1550, 1552, and PHYS 2101 before they enroll in any engineering course numbered above 2999. However, CE 3700, IE 3201, IE 4462, and PETE 3025 may be taken.

English proficiency is defined as a grade of "C" or better in all required English courses in the student's curriculum (ENGL 1001 and 2000).

More stringent requirements may be imposed by individual departments. Refer to the curricular requirements of each department.

ADMISSION REQUIREMENTS

Admission to the University does not constitute acceptance into the College of Engineering or into a particular curriculum within this college. Where enrollment may exceed the facilities of a department, it may be necessary to limit the size of the classes in that curriculum. In such cases, the department establishes criteria for admission with approval of the University administration.

Students may enter the college from University College or by transfer from another division of LSU or from another approved college or university.

Students in the *LSU Center for Freshman Year* who meet the following criteria will be admitted to the college:

- 24 or more semester hours of earned credit in courses numbered 1000 or above;
- LSU and overall gpa of 2.00 or better;
- credit in MATH 1550 with a grade of "C" or better.

Other students seeking admission from another division of LSU or by transfer from another college or university must also meet the above requirements. Students with more than 60 hours attempted will be considered for admission on the basis of the dean's evaluation of the entire academic record. Transfer students from other institutions must also meet University admission requirements as detailed in this catalog in the *Undergraduate Admissions* chapter.

TRANSFER OF CREDIT FROM OTHER INSTITUTIONS

In this college, transfer credits accepted by the Office of Undergraduate Admissions shall be valid for degree credit only to the extent to which they satisfy courses in the curricula of the college. Transfer credits in junior and senior engineering courses will be accepted only if taken in programs accredited by the Accreditation Board for Engineering and Technology.

Credit in courses in which grades of "D" have been earned is not accepted for transfer toward the degree requirements, if the course is taken outside the LSU System. Students enrolled in this college who wish to obtain credits from other colleges or universities (including other campuses of the LSU System) and who plan to use such credits toward degree requirements should obtain *prior approval* in writing on a specific-course basis from the dean's office.

COLLEGE OF ENGINEERING • UNDERGRADUATE DEGREES

Departments	Curricula	Degrees
Biological & Agricultural Engineering	Biological Engineering	Bachelor of Science in Biological Engineering
Gordon A. and Mary Cain Department of Chemical Engineering	Chemical Engineering	Bachelor of Science in Chemical Engineering
Civil & Environmental Engineering	Civil Engineering	Bachelor of Science in Civil Engineering
	Environmental Engineering	Bachelor of Science in Environmental Engineering
Construction Management & Industrial Engineering	Construction Management	Bachelor of Science in Construction Management
	Industrial Engineering	Bachelor of Science in Industrial Engineering
Electrical & Computer Engineering	Electrical Engineering	Bachelor of Science in Electrical Engineering
	Computer Engineering	
Mechanical Engineering	Mechanical Engineering	Bachelor of Science in Mechanical Engineering
Craft & Hawkins Department of Petroleum Engineering	Petroleum Engineering	Bachelor of Science in Petroleum Engineering

DEGREE REQUIREMENTS

It is the student's responsibility to qualify for the bachelor's degree by meeting these requirements:

- Completing one of the established curricula—any substitutions from the curricula as published must have written approval of the department chair and the dean's office.
- Achieving a 2.00 average, as required by the University, for all work taken at LSU and on all work attempted at U.S. institutions.
- Achieving a 2.00 average on all courses attempted in the major department at LSU and on all work attempted in the major field at U.S. institutions (with the exception of certain courses offered by the major departments for non-majors only). Civil engineering students must achieve a 2.00 average in all civil engineering (CE) and environmental engineering (EVEG) courses and on all work completed in the major field at U.S. institutions. Environmental engineering students must achieve a 2.00 average in all chemical engineering (CHE), civil engineering (CE), and environmental engineering (EVEG) courses and on all work completed in the major field at U.S. institutions.
- Successfully completing a minimum of 30 hours of residence in the College of Engineering. These 30 hours are included in the

University requirement that a minimum of 25 percent of the hours applied toward a degree be earned while in residence at the university. (These residence hours must include 15 hours of required major department courses or approved technical electives at the 3000 or 4000 level. Students must complete nine hours of these courses at the 4000 level in the major. The individual courses used to satisfy the residency requirement must be approved by the department chair.)

- Initiating the checkout procedure with the departmental advisor in the semester prior to the one in which the degree is to be awarded. The checkout is completed only when approved by the dean's office and the Office of the University Registrar.

COLLEGE POLICY FOR "D" GRADES AND REPETITION OF COURSES

Only those courses in which grades of "D" or "F" were earned may be repeated. Courses in which a grade of "F" were earned may be repeated only as allowed by the University as detailed in the "Undergraduate Degree Requirements" chapter of this catalog. A student who earns a "D" or "F" in a course in which a minimum grade of "C" is required must register for the course again in the next regular semester in which the student is enrolled and the course is offered. Students within 24 hours of graduation cannot duplicate sophomore-level courses in the major field.

READMISSION

A student seeking readmission to this college must submit an application for admission. The dean, with recommendation of the department in which the student seeks admission, will determine whether readmission is granted and may prescribe the conditions for reinstatement.

CORRESPONDENCE CREDITS

Correspondence courses to be used for degree credit must be approved by the office of the dean. Students must see a counselor in the Dean's Office to enroll and establish a Dean's Deadline for completion of the course. Consistent with University regulations, students may earn no more than one-fourth of the number of hours required for the bachelor's degree through correspondence study. In addition, no more than six hours of credit earned through correspondence study may be applied to a student's general education requirement.

Students not registered in campus courses may enroll in correspondence courses for degree credit; however, students who have been dropped from the University may not enroll in correspondence courses for degree credit.

Students registered in the University may enroll in a maximum of 21 semester hours of combined correspondence and campus course work during a regular semester and a maximum of 12 hours during the summer. Only in exceptional cases will students be allowed to enroll in correspondence course work during the semester they plan to graduate.

MINOR FIELD REQUIREMENTS (OPTIONAL)

A student may earn a minor in a second field. The specific requirements are determined by the department offering the minor. Students who plan to minor in a second field must see a counselor in the dean's office to initiate the proper procedures. A student must earn a minimum 2.00 overall gpa in the minor field.

► Biological Engineering

Any student not majoring in biological engineering may obtain a *minor in biological engineering* by completing each of these courses with a grade of "C" or better: BE 3340, 4303, 4341, 4380; BIOL 1201, 1208, 1202, 1209, and 2051.

► Construction Management

To graduate with a *minor in construction management*, non-majors must complete CM 1010, 2012, 2121, and nine additional hours of CM courses numbered above CM 2121. Registration in any CM course above CM 2121 is restricted to students admitted to a senior college with a declared CM major or minor. A grade of "C" or better is required in each course.

► Electrical and Computer Engineering

Any student not majoring in electrical or computer engineering may obtain a *minor in electrical and computer engineering* by completing each of these courses with a grade of "C" or better: EE 2120, 2130, 2230, 2720, 2730, 3120, 3750 and six additional hours of electrical engineering course work *excluding* EE 2950, 3060, 3061, 3070, 3950, and 3951.

► Environmental Engineering

To earn a *minor in environmental engineering*, students in the College of Engineering must complete EVEG 3100 and 3110 and five courses chosen from a list of approved courses available in the dean's office.

► Materials Science and Engineering

To earn a *minor in materials science and engineering*, a student must complete ME 2733, 3701, 4723, 4743, and three additional courses chosen from an approved list of technical electives. A grade of "C" or better in each course is required.

► Mechanical Engineering

To earn a *minor in mechanical engineering*, a student must complete 18 semester hours of credit in mechanical engineering with a grade of "C" or better in each course. At least six hours must be at the 4000 level.

► Occupational Health and Safety

To earn a minor in *occupational health and safety*, the student must complete IE 3302, 4461, 4462, and three courses from an approved list available in the dean's office. All courses must be completed with a grade of "C" or better. Interested students should contact the dean's office or the Department of Construction Management and Industrial Engineering.

► Quality and Reliability Engineering

To earn a *minor in Quality and Reliability Engineering*, a student must currently be enrolled in an engineering degree program, and must complete IE 3302,¹ 4362, 4453, and 4540 and two courses from the following: IE 4485,² 4490, 4785,³ ME 4733, and 4763. All courses for the minor must be completed with a grade of "C" or better. For additional information, contact the Department of Construction Management and Industrial Engineering.

¹ *Other engineering programs at LSU have basic probability and statistics courses which may be substituted. Contact the Department of Construction Management and Industrial Engineering.*

² *ECE and ME majors may be able to substitute combination of other courses in their program for this course. Contact the Department of Construction Management and Industrial Engineering.*

³ *Topic must be in the area of quality, reliability, or maintenance engineering. It is the student's responsibility to find a supervising faculty member.*

► Structural Engineering

To earn a *minor in structural engineering*, a student must complete CE 3415, 4400, 4410, 4430, 4435, and four additional courses chosen from an approved list of technical electives available in the dean's office. A grade of "C" or better in each course is required.

► Sugar Engineering

To earn a *minor in sugar engineering*, students in the College of Engineering must complete BE 4342, 4347, BIOL 2083 or CHE 4260, EE 3950, ME 4433, and an approved design project. A grade of "C" or better in each course is required.

► Surveying

A *minor in surveying* is available for students wishing to become licensed as professional land surveyors. Enrollees in any University major may pursue this program. The *State of Louisiana Revised Statutes*

37:693.B(3b) and (4f) specify the educational requirements necessary for licensing. These requirements are a bachelor's degree and satisfactory completion of specified required and elective courses totaling 30 semester credit hours. A list of required and elective courses may be obtained from the dean's office.

► Technical Sales

Students in the College of Engineering wishing to earn a *minor in technical sales* must complete ACCT 2000, BLAW 3201, ECON 2030, IE 3201 or PETE 3025, MGT 3200, MKT 3401, PHYS 1202, 2102, or 2002, and CMST 1061, 2010, 2060 or 2061.

Students in other colleges must have approval from the College of Engineering Dean's office to declare this minor.

Students who return to campus after having completed their undergraduate degrees and who complete the surveying or technical sales minors will be issued a certificate by the college.

► Transportation Engineering

To earn a *minor in Transportation Engineering*, a student must complete, with a grade of "C" or better in each course: CE 3600, 4600, 4620, 4650, 4670, and three additional courses chosen from an approved list of technical electives available in the Dean's Office. A grade of "C" or better in each course is required.

REQUIREMENTS FOR SECOND BACHELOR'S DEGREE

Students who hold one baccalaureate degree may wish to obtain a baccalaureate degree in engineering as a second degree. To do so, they must complete a minimum of 30 semester hours while enrolled in the department granting the second degree. In addition to the requirements of the first discipline, the student must satisfy all requirements for the second discipline, as shown in the curriculum.

They must attain a minimum 2.00 gpa average on all work scheduled while enrolled in the College of Engineering and on all work subsequent to receipt of the first degree. A student whose first degree was obtained elsewhere must also satisfy all the admission requirements of the college, as previously listed.

GRADUATE PROGRAMS

The college offers the Master of Science and the Doctor of Philosophy degrees through the Graduate School. The Master of Science program is mostly research oriented and emphasizes fundamental theory. It is offered in engineering science, agricultural, chemical, civil, electrical, industrial, mechanical, and petroleum engineering. The Doctor of Philosophy degree is awarded in the fields of chemical engineering, civil engineering, electrical engineering, mechanical engineering,

petroleum engineering, and engineering science. For additional information, consult the *Graduate Bulletin*.

THE ENGINEERING COUNCIL

The Engineering Council is a college-wide student organization whose members are the elected representatives of the various professional and honorary student organizations. In addition to the general goal of bridging organizational gaps between the different departments, the Engineering Council sponsors several student activities including an engineering newsletter and the annual Engineers' Week.

SPECIAL PROGRAMS

Career Services offers a *cooperative education program* in all curricula offered by the college. In some cases, course scheduling should be carefully coordinated with the department to ensure course availability. Students alternate periods of classroom attendance and employment, resulting in one year of work experience upon graduation. The Co-op Office will assist the student in obtaining employment in the student's area of interest. Although it may delay graduation, the program is an excellent opportunity to explore career choices and integrate classroom theory with industry practices. While employed, the student must also register, for a nominal fee, to be considered formally affiliated with the University. For additional information concerning this cooperative program, please see "Career Services Center" in the section "Student • University Services."

PHI KAPPA PHI

Founded in 1897 at the University of Maine, Phi Kappa Phi is the nation's oldest, largest, and most selective honor society for all academic disciplines. Its chapters are on nearly 300 campuses in the United States, Puerto Rico, and the Philippines. Each year, approximately 30,000 members are initiated. Some of the organization's more notable members include former President Jimmy Carter, writer John Grisham, NASA astronaut Wendy Lawrence, and Netscape founder James Barksdale. The LSU chapter was founded in 1930 as the 43rd chapter in the nation.

The mission of Phi Kappa Phi is to recognize and promote academic excellence in all fields of higher education and to engage the community of scholars in service to others. Phi Kappa Phi is unique because it recognizes superior scholarship in *all academic fields*, rather than restricting membership to a limited field.

Juniors in the top 7.5 percent and seniors and graduate students in the top 10 percent of their classes may be invited to become members of Phi Kappa Phi. New LSU Phi Kappa Phi members are initiated and honored in the spring semester each year and wear identifying ribbons on their academic gowns at commencement exercises. Additional information about the Society may be found at www.phikappaphi.org.

DEPARTMENTS AND CURRICULA

All curricula meet the University general education requirements with explicit course requirements and approved electives.

In each curriculum, the courses that are to be used to fulfill the general education requirement are marked with an asterisk.

All technical electives must have approval of the chair of the engineering department in which the student registers. Under no circumstances may electives be chosen from remedial courses or courses that are preliminary to the first courses in engineering. Examples of such courses are MATH 1021, 1022, PHYS 1100, etc. Students are advised to check with their departments on the selection of these electives.

DEPARTMENT OF BIOLOGICAL & AGRICULTURAL ENGINEERING

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PROFESSORS • Bengtson, Branch, Hannaman, Lima, Thomas, Velupillai
ASSOCIATE PROFESSORS • Hall, Mailander
ASSISTANT PROFESSORS • Barbosa, Boldor, Mashriqui, Monroe, Morris, Sabliov, Sathivel, Theegala
PROFESSIONAL-IN-RESIDENCE • Grymes
ADJUNCT FACULTY • Clemmens, Fouss, Greenland, Gregory, Li, Lopez, Parish, Robbins, Saska

Biological Engineering

Biological engineering integrates applied biology into the fundamental principles of engineering for the purpose of designing processes and systems that influence, control, or utilize biological materials and organisms for the benefit of society. The discipline applies the principles of analysis, synthesis, and design to physical problems and processing systems associated with plants, animals, and humans, and their environments.

The overall educational goal of the Biological Engineering Program is to educate biological engineering students to be technically and professionally competent and to meet the requirements for professional registration.

The specific educational objective is to produce engineering graduates with the attributes to use basic principles to synthesize and analyze biological and physical systems, and more specifically demonstrate that they have:

- an ability to apply knowledge of mathematics, science, and engineering;
- an ability to design and conduct experiments, as well as to analyze and interpret data;
- an ability to design a system, component, or process to meet desired needs;
- an ability to function on multi-disciplinary teams;

- an ability to identify, formulate, and solve engineering problems;
- an understanding of professional and ethical responsibility;
- an ability to communicate effectively;
- the broad education necessary to understand the impact of engineering solutions in a global and societal context;
- a recognition of the need for, and an ability to engage in life-long learning;
- a knowledge of contemporary issues;
- an ability to use techniques, skills, and modern engineering tools necessary for the engineering practice.

The Biological Engineering (BE) curriculum includes the study of basic sciences (mathematics, physics, chemistry, and biology), humanities (arts, economics, and social sciences), applied biology (organic chemistry, microbiology, and physiology), engineering sciences (statics, dynamics, strength of materials, fluid mechanics, electrical principles, and thermodynamics), and engineering design. Students can select technical and engineering electives that enable them to pursue specific career interests. Elective courses can also be used to complete the requirements for minor programs in electrical engineering, environmental engineering, mechanical engineering, occupational health and safety, surveying, or technical sales.

An undergraduate education in biological engineering is excellent preparation for graduate and professional studies in various fields of engineering (including biomedical engineering) and human or veterinary medicine. The curriculum teaches students the practical skills needed for professional engineering and the scientific understanding required to adapt to new situations.

Career opportunities in biological engineering include design, development, and implementation of technologies to recycle municipal waste and agricultural byproducts into viable sources of energy; systems to clean contaminated water and soil; equipment and procedures to prevent repetitive motion injuries; processing operations to ensure high quality foods; and machinery or sensors to be applied within human, animal, plant, and ecological systems. Graduates have the opportunity for local, national, or international work. Recent graduates are employed in large engineering firms, small consulting companies, and governmental agencies, or are pursuing graduate degrees.

A low student-to-faculty ratio in the department allows students to receive personal attention. Students also complete a senior design project that requires one-on-one direction from a faculty member. Numerous social activities with faculty, staff, and graduate students foster professional camaraderie that extends far beyond the classroom. Students may also gain professional insight and potential employment contacts through participation in a variety of national engineering and technical organizations.

The curriculum in biological engineering provides students with the skills needed to solve today's problems, and the knowledge required to master the rapid changes in technology and address the problems of tomorrow. This curriculum, offered through the College of Engineering, is accredited by the Accreditation Board for Engineering and Technology

(ABET). Graduates are prepared to take the *Fundamentals of Engineering* (FE) exam during their senior year, which is a first step for obtaining a Professional Engineering license.

CURRICULUM IN BIOLOGICAL ENGINEERING

TOTAL SEM. HRS. • 131

Biological Engineering Design Electives: select three from the list maintained by the department.

General education required courses are marked with asterisks ().*

FRESHMAN YEAR	SEM. HRS.
Biological Sciences 1201, 1208.....	4
Biological Sciences 1202, 1209.....	4
Biological Engineering 1250, 1252.....	4
Chemistry 1201,* 1202,*.....	6
English 1001,*.....	3
Mathematics 1550,* 1552*.....	9
Physics 2101*.....	3
—	—
	33

SOPHOMORE YEAR	SEM. HRS.
Biological Engineering 2350, 2352.....	6
Biological Sciences 2051.....	4
Civil Engineering 2450, 3400.....	6
Chemistry 1212.....	2
Chemistry 2261.....	3
English 2000*.....	3
Electrical Engineering 2950.....	3
Mathematics 2065.....	3
Physics 2102.....	3
—	—
	33

JUNIOR YEAR	SEM. HRS.
Biological Engineering 3340, 4303.....	6
Biological Engineering 4352.....	3
Biological Sciences 2083.....	3
Civil Engineering 2200.....	3
Civil Engineering 2460 or Mechanical Engineering 3133.....	3
Elective or ROTC.....	3
Engineering design electives.....	6
Agricultural Economics 2003 or Economics 2030*.....	3
Mechanical Engineering 3333.....	3
—	—
	33

SENIOR YEAR	SEM. HRS.
Biological Engineering 3190, 3320, 4290, 4292.....	8
Engineering design electives.....	6
General education arts/humanities/social sciences courses*.....	15
Technical elective or ROTC.....	3
—	—
	32

GORDON A. AND MARY CAIN DEPARTMENT OF CHEMICAL ENGINEERING

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ASSOCIATE PROFESSORS • Flake, Spivey, Thompson, Wetzel
ASSISTANT PROFESSOR • Benton, Henry, Hung
INSTRUCTORS • Cygan, Lashover, Mowrey, Toups

Chemical engineers apply scientific principles to the solution of problems involving chemical and physical change. They design, install, and operate complete processes for the efficient production of materials and tailor the properties of materials for specific applications. Chemical engineers today play a direct professional role in such diverse areas as chemical processing; petroleum refining; pollution control and abatement; materials processing; biochemical engineering; instrumentation; computer automation, control, and modeling; biomedical engineering; oceanography; energy; food processing; systems engineering; and manufacturing.

Louisiana and the Gulf Coast region lead the nation in growth of the chemical, petroleum, and materials industries. In these industries, about 40 percent of the professional staffs are chemical engineers. Besides providing technical leadership for these industries, chemical engineers are a major source of management personnel. Chemical engineering also offers many opportunities for independent enterprise.

Chemical engineers must combine many different abilities in their work. These include an aptitude for chemistry, computer science, physics, mathematics, and economics; the capability of presenting decisions to management in a lucid and concise manner; and the ability to bring scientifically oriented talents to bear on practical problems.

The undergraduate curriculum is concerned primarily with fundamentals, and basic courses in mathematics, chemistry, and chemical engineering are required. Through a series of elective courses, students may select a formal concentration in one of three areas: bioengineering, environmental, or materials. Alternatively, students can use these electives to plan a program that emphasizes a subfield of their choice. The curriculum requires liberal amounts of arts, humanities, and social sciences electives to satisfy the University's general education and external accreditation requirements. These serve to prepare students for the responsibilities of citizenship, aside from a technical career. The undergraduate curriculum is oriented toward the use of computers, which have become an integral part of the engineering profession.

Chemical engineers are among the highest-salaried graduates in engineering across the nation. In the foreseeable future, it is predicted that the supply of chemical engineers

available to industry will not match the demand; consequently, the salary and job opportunities should continue to be favorable.

The chemical engineering curriculum has held continuous accreditation by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology since 1939.

3/2 Program in Chemistry and Chemical Engineering

The Department of Chemistry at Southern University and the Gordon A. and Mary Cain Department of Chemical Engineering at LSU offer a dual degree in chemistry and chemical engineering. The student, after successful completion of the required courses in both curricula, will be awarded a Bachelor of Science degree in Chemistry from Southern University and a Bachelor of Science in Chemical Engineering degree from LSU. The first three years of course work are taken principally at Southern University and the last two years principally at LSU.

CURRICULUM IN CHEMICAL ENGINEERING

TOTAL SEM. HRS. • 132-134

Chemistry, Physics, Life Sciences and Mathematics Proficiency • A grade of "C" or better in each of the basic sciences preparatory courses—BIOL 1201; CHEM 1201 and 1202; PHYS 2101 and 2102; MATH 1550, 1552, and 2090—is required before students may register for any chemical engineering course other than CHE 2160 and 2171.

Residence Requirement • Students must complete at least 18 residence hours of required chemical engineering courses, including CHE 4172, and exclusive of approved chemical engineering electives.

Academic Warning • Any chemical engineering student whose cumulative grade point average on all chemical engineering courses is less than a 2.00 shall be placed on academic warning status. Such students will receive a letter from the department chair informing them of their gpa, and reminding them that a 2.00 or better gpa in all chemical engineering courses is required for the BSChE degree.

Academic Probation • Any chemical engineering student whose cumulative gpa on all chemical engineering courses attempted is seven or more quality points below a 2.00 shall be placed on departmental scholastic probation. Students will remain on departmental scholastic probation until they have achieved a gpa of 2.00 or better on all chemical engineering courses attempted. Such students will receive a letter from the department chair informing them of their probationary status, reminding them that a 2.00 gpa in all chemical engineering courses is required for the BSChE degree, and cautioning them that a further loss of quality points may result in their being dropped from the department.

Academic Drop • Any chemical engineering student whose cumulative gpa on all chemical engineering courses attempted is 10 or more quality points below a 2.00 shall be

dropped from the department. Students dropped for the first time shall be ineligible to enroll in chemical engineering courses for one full semester (fall or spring) following their drop. Students dropped for a second time shall be ineligible to enroll in chemical engineering courses for one calendar year. In either instance, readmission to the department may be delayed or denied at the discretion of the department chair.

General education required courses (*).

FRESHMAN YEAR	SEM.	HRS.
Biology 1201*	3
Chemistry 1201,* 1202,* 1212.	8
English 1001*	3
Mathematics 1550,* 1552*.	9
Physics 1201 or 2101*	3-4
General education arts/humanities/ social sciences courses*.	6
	—	32-33

SOPHOMORE YEAR	SEM.	HRS.
Chemical Engineering 2160, 2171, 2176...	7
Chemistry 2261, 2262, 2364.	8
Civil Engineering 2450.	3
Economics 2030*	3
English 2000.	3
Mathematics 2090.	4
Physics 1202 or 2102.	3-4
General education arts/humanities/ social sciences courses*.	3
	—	34-35

JUNIOR YEAR	SEM.	HRS.
Chemical Engineering 3101, 3102, 3104, 3171, 3172, 3173.	19
Chemistry 3491.	3
Mechanical Engineering 2733.	3
Approved electives or area of concentration courses.	3
General education arts/humanities/ social sciences course*.	6
	—	34

SENIOR YEAR	SEM.	HRS.
Chemical Engineering 4151, 4162, 4172, 4190, 4198.	17
Approved electives or area of concentration courses.	12
Elective.	3
	—	32

Areas of Concentration

Lists of approved area electives approved for the chemical engineering concentrations are available from the department. Depending on the particular area electives selected, students may be required to take one or more additional prerequisite course(s).

◆ Biomolecular

Required Courses (15 hrs.)

Junior Year: Area electives (3 hrs.)

Senior Year: Area electives (12 hrs.)

◆ Environmental

Required Courses (15 hrs.)

Junior Year: Area electives (3 hrs.)

Senior Year: Area electives (12 hrs.)

◆ Materials

Required Courses (15 hrs.)

Junior Year: Area electives (3 hrs.)

Senior Year: Area electives (12 hrs.)

DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING

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Mohammad, Pardue, Rusch, Voyiadjis

ASSOCIATE PROFESSORS • Alshibli, Cai,

Chen, Ishak, Levitan, Moe, Sharma, Van Heerden

(Research), Willson, Wilmot, Wolshon

ASSISTANT PROFESSORS • Abu-Farsakh,

Bharbato, Deng, Elseifi, Moorthy, Okeil, Shin,

Smith, Tsai, Zhang

INSTRUCTORS • Jacobs, Mugnier

ADJUNCT FACULTY • Alaywan, Morrison, Yan

The Department of Civil & Environmental Engineering offers two curricula that are designed to provide a broad, but integrated education in the scientific, mathematical, engineering, sociohumanistic, and ethical principles that are the basis for a professional career. The curricula also provide sound preparation for continued professional development through informal studies, continuing education programs, or graduate study in a specialized engineering or related field. The philosophy of the faculty is to offer students a quality education, preparing them to enter any field of civil or environmental engineering. The department assists students in achieving the technological, communication, and interpersonal competencies, as well as a sensitivity to and understanding of socioeconomic issues, necessary for the professional practice of engineering.

For those students wishing to concentrate in environmental engineering, two opportunities are available. Students pursuing the civil engineering degree may select 20 hours of electives during the senior year with emphasis on technical, socio-economical, and regulatory issues in environment engineering. Alternatively, students may pursue the more specialized environmental engineering curriculum leading to the BS in Environmental Engineering.

In collaboration with external Civil and Environmental Engineering Program Advisory Committees, the faculty established the following program educational objectives for the undergraduate degree programs:

- consistent with the mission of the University, provide quality undergraduate programs in civil and environmental

engineering which focus on the efficient, economic, environmentally sensitive, and socially responsible design, maintenance, and improvement of the state and national infrastructure;

- attract, retain, develop, and support excellent faculty, students, and staff that have the capability and motivation to achieve the program educational and outcomes objectives of the programs;
- provide modern instructional facilities to support the development of experimental, computational, and design skills; ensure the continual improvement of the programs through an active assessment and evaluation process that encompasses the constituencies of the program;
- provide adequate resources and administrative support to ensure that the program educational and outcomes objectives of the programs can be met; and
- support student chapter programs, as well as promote student participation in professional organizations and service activities.

The department is committed to the continual improvement of its BS degree programs in civil engineering and environmental engineering. Specific outcome objectives have been established for the degree programs and will utilize the following measures for assessing the achievement of these objectives:

- technical and professional capabilities of students in open-ended project design courses
- student, alumni, and employer surveys
- faculty assessment of ethical behavior of students
- student participation in professional organizations
- student performance on the *Fundamentals of Engineering* (FE) examination
- subsequent professional registration of graduates
- success of graduates in post-graduate degree programs

The data from these assessment measures will be evaluated and used as the basis for improvement of all elements of the degree programs.

Bachelor of Science Degree in Civil Engineering

Civil engineering is a profession that advances the well-being of people, while improving and protecting the environment. A civil engineer gains knowledge of mathematics and physical sciences through study, experience, and practice. This knowledge is applied with judgment under economic constraints to provide facilities for living, industry, transportation, and a myriad of other activities. Civil engineering graduates can practice in the fields of structural, transportation, hydraulic, water resources, geotechnical, construction, environmental, and public works engineering. They are employed by private industry as well as governmental agencies and many ultimately establish their own consulting engineering businesses.

The philosophy of the department is to provide the students a broad background in key areas of civil engineering, and the opportunity for specialization through electives.

Specifically, students take several courses each in the fields of structural, geotechnical, transportation, surveying, water resources, and environmental engineering. Eighteen hours of electives in the senior year provide the means for a student to specialize in one or two of these areas, if desired.

The graduates of the civil engineering program shall:

- be prepared to take a leading role in the provision, upkeep, and improvement of the state and national infrastructure in an efficient, economic, environmentally sensitive, and socially responsible manner;
- have an understanding of professional practice issues, understand their roles in a local and global societal context, and have the interpersonal and communication skills needed to be effective engineers;
- be prepared and motivated to become licensed professional engineers and to continue their education through professional development and post graduate programs;
- be proficient in analysis and structural, transportation, geotechnical, and water resources engineering; and
- be proficient in laboratory and field measurements and the ability to design, conduct, and critically evaluate the results of experiments in the areas of hydraulics, construction materials, and geotechnical engineering.

The successful civil engineer is a registered professional engineer who affiliates with various professional and technical societies. The department recommends that its students join and participate in the Student Chapter of the American Society of Civil Engineers and encourages each senior to take the *Fundamentals of Engineering* (FE) examination that is a partial requirement for registration as a professional engineer.

The civil engineering program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Bachelor of Science Degree in Environmental Engineering

Environmental engineering is a separate and distinct baccalaureate degree program within the Department of Civil & Environmental Engineering. As a discipline, environmental engineering is defined as "...the application of engineering principles to improve and maintain the environment for the protection of human health, for the protection of nature's beneficial ecosystems, and for environment-related enhancement of the quality of life." The degree program is broad based and encompasses resource management; conception, planning, design, construction and operation of engineered systems for the protection of human health; the protection and management of the environment; air, water (surface subsurface, and groundwater), and land interactions and transformations; the behavior of natural systems, including their response to the activities of man; professional responsibility; and multi-disciplinary efforts across private and public sectors to assure environmental protection. For achieving additional depth in specific areas of environmental engineering, elective courses are

available in a range of topics including in-situ waste site remediation, computer modeling, use of natural systems for wastewater treatment, and special topics and design/research project courses.

The basic mission of the program is to provide the fundamental intellectual knowledge, when supplemented by professional experience, that will provide the technical and interpersonal skills required to conceive, plan, design, and implement the systems needed to provide and ensure environmental protection for human health and the sustainability of our natural ecosystem.

The graduates of the environmental engineering program shall:

- possess the technical and professional skills needed to ensure that they are adequately prepared to enter and progress professionally in the practice of environmental engineering or progress academically in advanced areas of study;
- be proficient in the fundamentals of mathematics and statistics, computational methods, natural and physical sciences, and chemical, civil, and environmental engineering sciences necessary to communicate and collaborate effectively with a broad spectrum of environmental professionals;
- have an introductory level of knowledge of environmental issues associated with air, land, and water systems and associated environmental health impacts;
- be proficient to conduct laboratory experiments and analyze and interpret data in the areas of soil properties and behavior, water quality and unit operations—physical, chemical, and biological;
- have the ability to perform engineering analysis and design of water, air, and land treatment/protection systems that minimize risk to the environment and public health;
- have an understanding of concepts of professional practice and the roles and responsibilities of public institutions and private organizations pertaining to environmental engineering and the interpersonal and communication skills needed to be effective engineers and citizens; and
- become licensed professional engineers and continue their education through professional development and post graduate programs.

Students are encouraged to participate in the activities of the student chapters of the Louisiana Water Environment Association and the American Society of Civil Engineers. Other professional organizations that may be of interest to students include the National Society of Black Engineers, the Society of Women Engineers, and the Organization of Students Concerned About Resources.

The department encourages each senior to take the *Fundamentals of Engineering* (FE) examination that is a partial requirement for registration as a professional engineer.

The environmental engineering program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

CURRICULUM IN CIVIL ENGINEERING

TOTAL SEM. HRS. • 135

Civil Engineering majors must earn a grade of "C" or better in CHEM 1202, PHYS 2101, PHYS 2102, MATH 1550, MATH 1552, MATH 2057, CE 2200, CE 2450, CE 2460, and CE 3400 before registering for any subsequent courses that require the above as prerequisites.

General education required courses()*

FRESHMAN YEAR	SEM. HRS.
Chemistry 1201,* 1202*.....	6
Civil Engineering 2700.....	2
Construction Management 1030.....	2
English 1001*.....	3
Geology 1001.....	3
Mathematics 1550,* 1552*.....	9
Physics 2101*.....	3
Basic sciences lab elective.....	1
General education arts, humanities, social sciences course*.....	3
General education life science course*.....	3
	35

SOPHOMORE YEAR	SEM. HRS.
Civil Engineering 2200, 2450, 2460, 2720, 3400.....	15
Electrical Engineering 2950.....	3
Experimental Statistics 2201.....	4
Mathematics 2057, 2065.....	6
Physics 2102.....	3
General education arts, humanities, social sciences course*.....	3
	34

JUNIOR YEAR	SEM. HRS.
Civil Engineering 2250, 3200, 3300, 3350, 3410, 3415, 3500, 3600, 3700... ..	19
Environmental Engineering 3100, 3110... ..	6
English 2000*.....	3
Economics 2030*.....	3
Mechanical Engineering 3333.....	3
	34

SENIOR YEAR	SEM. HRS.
Civil Engineering 4410.....	3
Civil Engineering 4750.....	2
Civil engineering analysis elective.....	3
Civil engineering design electives.....	6
Civil engineering project elective.....	3
Civil engineering technical elective or ROTC	3
Civil engineering technical elective.....	3
General education arts, humanities, social sciences courses*.....	9
	32

CURRICULUM IN ENVIRONMENTAL ENGINEERING

TOTAL SEM. HRS. • 129

General education required courses ().*

FRESHMAN YEAR	SEM. HRS.
Biological Sciences 1201*, 1208.	4
Chemistry 1201,* 1202,* 1212.	8
English 1001*	3
Mathematics 1550,* 1552.	9
Physics 2101*	3
General education arts, humanities, social sciences course*	3
Geology 1001	3
	—
	33

SOPHOMORE YEAR	SEM. HRS.
Civil Engineering 2200, 2450, 2720.	9
Environmental Engineering 2000, 3400	6
Chemistry 2060/2261	3
English 2000.	3
Mathematics 2065.	3
Physics 2102	3
Mechanical Engineering 3333.	3
Experimental Statistics 2201.	4
	—
	34

JUNIOR YEAR	SEM. HRS.
Civil Engineering 3200, 3300, 3350.	7
Environmental Engineering 3100, 3110, 4135.	10
Environmental engineering technical elective	3
Chemical Engineering 3100, 3102	7
Economics 2030*	3
General education arts, humanities, social sciences course*	3
	—
	33

SENIOR YEAR	SEM. HRS.
Environmental Engineering 4110, 4120	5
Environmental Engineering 4150, 4151 or 3171, 3172.	6
Environmental engineering design elective.	3
Chemical Engineering 4253	3
Industrial Engineering 3201	3
General education arts, humanities, social sciences courses*	9
	—
	29

DEPARTMENT OF CONSTRUCTION MANAGEMENT & INDUSTRIAL ENGINEERING

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 PROFESSORS • Egbelu, Liao, Sarker
 ASSOCIATE PROFESSORS • Aghazadeh, Kinchen, Knapp, Ray, Rosso
 ASSISTANT PROFESSORS • Harvey, Hassan, Ikuma, Jiang, Nahmens
 INSTRUCTORS • Davis, Pecquet, Roider, Schneider, Shanmugan, Trahan
 PROFESSIONALS-IN-RESIDENCE • Patin, Spring

The Department of Construction Management and Industrial Engineering offers two degree programs: the degree of Bachelor of Science in Construction Management and the degree of Bachelor of Science in Industrial Engineering. The Construction Management degree is accredited by the American Council for Construction Education. The Industrial Engineering degree is accredited by the Accreditation Board for Engineering and Technology.

Bachelor of Science Degree in Construction Management

Construction management is the process of coordinating and managing residential, commercial, industrial and highway construction projects from the site survey until completion. The Construction Management program at LSU covers all aspects of this process. Modern construction has been rapidly evolving, incorporating sophisticated new construction technologies and new information-driven management practices to drive productivity improvements. These changes have in turn driven a high demand for graduates knowledgeable in these technologies and practices.

The department recognizes that its construction management graduates are professional constructors, distinct from engineers and architects. The curriculum is designed to blend the technical aspects with the business management aspects of the construction industry to produce a professional graduate who can manage construction processes effectively and efficiently.

CURRICULUM IN CONSTRUCTION MANAGEMENT

TOTAL SEM. HRS. • 126

Admission into the College of Engineering is required for construction management majors prior to taking any construction management course numbered above CM 2121.

A grade of "C" or better is required in all CM prerequisite courses; ENGL 1001 and 2000; MATH 1550; PHYS 2001 and 2002. General education required courses are marked with asterisks ().*

FRESHMAN YEAR	SEM. HRS.
Construction Management 1010, 2012.	6
English 1001*	3
General education arts course*	3
General education life sciences course*	3
General education humanities course*	6
Geology 1001*	3
ISDS 1100.	3
Mathematics 1550*	5
	—
	32

SOPHOMORE YEAR	SEM. HRS.
Accounting 2000, 2101.	6
Construction Management 2121, 2131, 2141	9
Economics 2030*	3
English 2000*	3
Physics 2001,* 2002*	6

General education communication studies course*	3
General education social sciences course	3
	—
	33

JUNIOR YEAR	SEM. HRS.
Construction Management 3000, 3100, 3121, 3131, 3141, 3210, 3303, 3400, 3505.	27
Experimental statistics 2201* or Mathematics 1552*	4
	—
	31

SENIOR YEAR	SEM. HRS.
Construction Management 3506, 4200, 4201, 4202.	12
Approved business/management electives	9
Approved electives or ROTC	6
Industrial Engineering 3201	3
	—
	30

Bachelor of Science Degree in Industrial Engineering

Industrial Engineering involves the synthesis and applications of scientific principles to design, installation, and improvement of integrated systems of people, materials, information, and equipment to provide the most efficient and effective operating and work environment. It combines principles of human behavior with concepts of engineering procedure or analysis.

Industrial engineers engage in ergonomics and human factors engineering, safety engineering, work systems measurement, methods development and improvement, CAD/CAM, industrial automation and robotics, systems integration, manufacturing processes design, facilities and plant layout/design, production planning and control, material handling and supply chain systems, operation research and logistics, computer modeling and simulation, quality assurance, statistical analysis and control, and reliability engineering.

The industrial engineer combines the abilities of an engineer and a manager. These include an aptitude for mathematics, statistics, and economics, as well as for the basic engineering sciences; an interest in working with people and systems that produce goods or services; and the ability to analyze, synthesize, and integrate technical knowledge in practical ways.

The program educational objectives are to:

- provide quality education;
- equip the graduate as a problem solver;
- produce graduates who are content with their educational experience; and
- produce graduates that are acceptable for placement into the industrial and service sectors of the economy.

CURRICULUM IN INDUSTRIAL ENGINEERING

TOTAL SEM. HRS. • 125

Industrial Engineering Electives • Choose from the list maintained in the department.

Students may optionally take three hrs. of advanced ROTC course work in place of one IE technical elective.

General education required courses ().*

FRESHMAN YEAR	SEM. HRS.
Chemistry 1201,* 1202*.....	6
Construction Management 1030.....	2
Industrial Engineering 1002, 2060.....	6
English 1001.....	3
Mathematics 1550,* 1552*.....	9
Physics 2101,* 2108.....	4
Communication studies 1061 or ROTC... ..	3
	—
	33

SOPHOMORE YEAR	SEM. HRS.
Biology 1001 or 1201*.....	3
Construction Management 2141.....	3
Civil Engineering 2450.....	3
Economics 2030*.....	3
Electrical Engineering 2950.....	3
English 2000.....	3
Industrial Engineering 3302.....	3
Mathematics 2090.....	4
Mechanical Engineering 2733.....	3
Physics 2102, 2109.....	4
	—
	32

JUNIOR YEAR	SEM HRS.
Civil Engineering 3400.....	3
Industrial Engineering 3201, 3520, 4362, 4425, 4453, 4520.....	18
Mechanical Engineering 3633.....	3
General education arts, humanities, social sciences courses*.....	6
	—
	30

SENIOR YEAR	SEM HRS.
Industrial Engineering 4461, 4516, 4530, 4599.....	12
Approved industrial engineering electives..	9
General education arts, humanities, social sciences course*.....	9
	—
	30

DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

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El-Amawy, Feldman, Gu, Mendrela, Rai,

Ramanujam, Srivastava, Woods, Zhou

ASSOCIATE PROFESSORS • Daniels-Race,

Koppelman, Naraghi-Pour, Skavantzios, Trahan,

Vaidyanathan, Wu

ASSISTANT PROFESSORS • Choi, Gunturk,

Hah, Liang, Peng, Wei

INSTRUCTORS • Audiffred, De Souza,

Rabalais, Scalzo

ADJUNCT FACULTY • Harbour, McAnelly

ADJUNCT FACULTY RESEARCH • Katz

Electrical and computer engineering are primarily concerned with the generation, control, and distribution of electric energy and information. The department offers undergraduate and graduate programs and conducts research to serve the needs of the state and the nation.

Program Educational Objectives

- Educate students so that, upon graduation, they will be able to pursue a productive career.
- Provide the necessary background for students who wish to do advanced study at LSU or elsewhere.

Program Outcomes

In order to meet the program objectives, a graduate of the program will have accomplishments consistent with the general criteria specified by the Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology (ABET).

Electrical and computer engineering students receive a thorough foundation in mathematics, physics, and introductory engineering during the first two years. Emphasis during the junior and senior years is on advanced engineering concepts and design. Engineering design is introduced in the first part of the junior year so that by the time students reach senior status they are prepared to take required courses dealing primarily with design. The senior courses utilize the previously gained knowledge in solving real-life problems. This prepares students for excellent career opportunities in areas such as computer engineering, energy conversion, power systems, communications, network design, control systems, electronics, and signal processing, as well as many interdisciplinary areas. With the background in fundamental theory and laboratory practice provided in the curricula, graduates are prepared to contribute and progress in their chosen technological fields.

The department offers two programs of study—electrical engineering and computer engineering, both leading to the degree of Bachelor of Science in Electrical Engineering. The electrical engineering curriculum provides a broad background in electrical engineering through the required course sequence. Elective courses permit students to develop a program in one of the three areas of technical concentration, as outlined below. The approved technical electives permit students to obtain more depth in the chosen area, explore other areas of electrical engineering, or explore other fields of engineering and science. The electrical engineering program is accredited by ABET.

The computer engineering curriculum is available for students desiring more comprehensive knowledge of the principles that

underlie the organization, design, and application of computer systems. The computer engineering program is also accredited by ABET.

A student must take *all* of the required courses in either the electrical engineering or the computer engineering curriculum, as stated below, in order to obtain a degree.

Students interested in continuing their education through master's and doctoral programs are advised to seek academic counseling early and to make judicious use of their undergraduate electives.

CURRICULUM IN ELECTRICAL ENGINEERING

TOTAL SEM. HRS. • 127

A prerequisite to any electrical engineering course may be met only by obtaining a "C" or better in each course cited as a prerequisite. This rule does not apply to EE 2950, EE 3950, or EE 3951.

Elective courses are available so that expertise may be obtained in one or more of the following three areas:

Electronics • theory, design, and fabrication of solid-state devices and design of electronic circuits and systems.

Energy • energy conversion, power system design and analysis, and control of power systems.

Systems and Signal Processing • automatic control, networks, signal processing, and communication. Additional information concerning these areas and guidelines for selecting electives are available in the departmental office.

General education required courses ().*

FRESHMAN YEAR	SEM. HRS.
Chemistry 1201*.....	3
General education life sciences course*.....	3
English 1001*.....	3
Mathematics 1550,* 1552*.....	9
Physics 2101,* 2108.....	4
General education arts/humanities/social sciences courses*.....	3
Philosophy 2018 or ROTC.....	3
Communication studies 2061 or ROTC... ..	3
	—
	31

SOPHOMORE YEAR	SEM. HRS.
Computer Science 1253, 1254.....	6
Electrical Engineering 2120, 2130, 2230, 2231, 2720, 2730.....	15
Mathematics 2057, 2090.....	7
Physics 2102*.....	3
English 2000.....	3
	—
	34

JUNIOR YEAR	SEM. HRS.
Electrical Engineering 2731, 3140, 3220, 3221, 3320, 3410, 3530, 3610, 3750, 3751.....	26
General education arts/humanities/social sciences courses*.....	3
Social Science Elective at the 2000 level or above*.....	3
	—
	32

SENIOR YEAR	SEM. HRS.
Electrical engineering design electives.....	12
General education arts/humanities/social sciences courses*.....	9
Approved technical electives.....	9
	—
	30

CURRICULUM IN COMPUTER ENGINEERING

TOTAL SEM. HRS. • 128

A prerequisite to any electrical engineering course may be met only by obtaining a "C" or better in each course cited as a prerequisite. This rule does not apply to EE 2950, EE 3950, or EE 3951.

General education required courses ().*

FRESHMAN YEAR	SEM. HRS.
Chemistry 1201*.....	3
English 1001*.....	3
General education life science course*.....	3
Mathematics 1550,* 1552*.....	9
Physics 2101,* 2108.....	4
General education arts/humanities/social sciences courses*.....	3
Philosophy 2018 or ROTC.....	3
Communication studies 2061 or ROTC.....	3
	—
	31

SOPHOMORE YEAR	SEM. HRS.
Computer Science 1253, 1254.....	6
Electrical Engineering 2120, 2130, 2230, 2231, 2720, 2730.....	15
Mathematics 2057, 2090.....	7
Physics 2102*.....	3
English 2000.....	3
	—
	34

JUNIOR YEAR	SEM. HRS.
Computer Science 3102.....	3
Electrical Engineering 2731, 3140, 3220, 3221, 3750, 3751.....	17
General education arts/humanities/social sciences courses*.....	6
Social Science elective at the 2000 level or above*.....	3
Approved mathematics elective.....	3
	—
	32

SENIOR YEAR	SEM. HRS.
Computer Science 4103.....	3
Electrical Engineering 4720, 4750.....	7
Electrical engineering design electives.....	6
Approved technical electives.....	9
General education arts/humanities/social sciences courses*.....	6
	—
	31

DEPARTMENT OF MECHANICAL ENGINEERING

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PROFESSORS • Acharya, Charalampopoulos, Khonsari, Meng, Nikitopoulos, Pang, Ram, Raman, Sinclair, Wang
ASSOCIATE PROFESSORS • deQueiroz, Deviredy, Gonthier, Kelly, Murphy, Waggenspack, Wahab, Woldesenbet, Wong
ASSISTANT PROFESSORS • Deviredy, Gonthier, Guo, Li, Moldovan, Park
ADJUNCT FACULTY • Courtiar, Helms, Shelton, Stubblefield, Yanitell

Mechanical engineering emerged as a new field of engineering during the Industrial Revolution when many labor-saving inventions were designed and built in England between 1750 and 1850. The role of the mechanical engineer has expanded dramatically in recent years and nearly 10,000 graduates are now needed yearly.

All large industries employ mechanical engineers. Among those who regularly hire graduates from LSU are automotive, industrial machinery, oceanographic, power, chemical, textile, petroleum, computer, metal manufacturing, electronic, paper and wood product, and aerospace corporations.

In these industries, mechanical engineers perform a large variety of functions; therefore, the education of a mechanical engineer is necessarily broad. Mechanical engineers use the basic sciences (such as chemistry and physics), mathematics, computer programming, oral and written communication skills, and humanities and social sciences. Almost invariably, mechanical engineers rely heavily on a firm understanding of mechanics and thermal sciences to analyze the conversion and transmission of energy in its many forms.

Mechanical engineers use this knowledge in research by attempting to solve new problems, in development by altering a system to fit a new need, and in design to describe in detail a machine, system, or approach to a problem. Testing, manufacturing, operation and maintenance, marketing and sales, and administration also require large numbers of mechanical engineers. Mechanical engineering, a technical professional field, offers challenge and opportunity for those prepared for hard work, both in school and during a lifetime of service.

The Department of Mechanical Engineering is committed to continuing its three-fold mission of:

- Producing graduate and post-graduate engineers who meet the needs of industry, government and academia.
- Advancing the state of knowledge and technology through innovative fundamental and applied research.
- Serving the community and the profession through programs of education, technology transfer, and consulting.

The mechanical engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

To qualify for graduation, mechanical engineering students must demonstrate the ability to:

- Apply accepted engineering methodologies and tools to design and realize the reliable and economical engineering systems and components.
- Quantify and alter the performance of proposed or existing systems.
- Design and conduct pertinent experiments in order to investigate physical systems and validate engineering models using appropriate analyses and interpretation of relevant data.
- Use basic scientific principles, mathematics, modern programming, and computational methods in modeling, simulating, and analyzing engineering systems.
- Demonstrate an understanding of engineering materials and their application, as well as a working knowledge of the dynamics and control of mechanical, thermal, and fluid systems.
- Present ideas and information effectively in both written reports and oral presentations.
- Work effectively in groups and as individuals with an awareness of multidisciplinary influences and challenges.
- Acquire a degree of professionalism commensurate with a contemporary, entry-level engineer, with a commitment to ethical practice, social responsibility, and continuing professional development.
- Become well-rounded engineers through study of and exposure to topics in the arts, humanities, and social sciences.

CURRICULUM IN MECHANICAL ENGINEERING

TOTAL SEM. HRS. • 130-131

A grade of "C" or better is required in Chemistry 1202, Mathematics 1552, and Physics 2101 (or equivalent courses) before a student may enroll in Mechanical Engineering 2334.

A grade of "C" or better is required in MATH 2090 (or equivalent course) before a student may enroll in Mechanical Engineering 3834.

Students are required to take one technical elective (Type B). Students who are planning to receive a commission in the armed forces may substitute three hours of Advanced ROTC credits in place of this technical elective (Type B).

General education required courses ().*

FRESHMAN YEAR	SEM. HRS.
Chemistry 1201, 1202*.....	6
Chemistry 1212 or Physics 2108.....	1-2
Construction Management 1020.....	2
English 1001.....	3
General education Life Sciences elective... ..	3
Mathematics 1550, 1552*.....	9
ME/CSC 2533.....	3

Physics 2101.	3
General education arts, humanities, social sciences course*.....	3
ROTC.	0-3
	33-37
SOPHOMORE YEAR	SEM. HRS.
Civil Engineering 2450, 3400.	6
Electrical Engineering 2950.	3
English 2000*.....	3
Mathematics 2057, 2090.....	7
Mechanical Engineering 2212, 2334, 2723, 3133, 3701.....	13
Physics 2102.	3
	35
JUNIOR YEAR	SEM. HRS.
Economics 2030*.....	3
Electrical Engineering 3950.	2
Mechanical Engineering 3143, 3603, 3633, 3752, 3834, 4133, 4244, 4433, 4611... ..	26
General education arts, humanities, social sciences course*.....	3
	34
SENIOR YEAR	SEM. HRS.
Mechanical Engineering 4183, 4201, 4202, 4243, 4621.....	10
General education arts, humanities, social sciences courses*.....	9
Approved technical electives (may include up to three hours of Advanced ROTC as above).....	9-6
	28-25

Although the petroleum engineering curriculum is designed primarily for careers in the petroleum industry, it is suitable for careers in related areas such as ground water hydrology, geothermal energy, solution mining, and under-ground storage or disposal of fluids. Professional courses in drilling and production, well design, reservoir engineering, petrophysics, well logging, and the phase behavior of hydrocarbons systems follow basic course work in mathematics, chemistry, physics, geology, and the engineering sciences. Additionally, the faculty gives specific attention to the economic evaluation of drilling and production operations.

The department is active in obtaining summer employment in the petroleum industry for its students. The department also strongly recommends that its students join and participate, as student members, in the Society of Petroleum Engineers and take the *Fundamentals of Engineering* (FE) examination during their senior year as preparation for licensure as a professional engineer.

The nationally ranked Craft & Hawkins Department of Petroleum Engineering at LSU has alumni throughout the world working for major companies, small independent companies, government agencies, and as independent consultants.

The petroleum engineering program is accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

Economics 2030*.....	3
General education arts/humanities/social sciences courses*.....	3
	33

JUNIOR YEAR	SEM. HRS.
Civil Engineering 2200, 3400.....	6
Civil Engineering 2460 or Mechanical Engineering 3133.....	3
English 2000*.....	3
Mechanical Engineering 3333.....	3
Petroleum Engineering 3025, 3036, 3037, 3053, 4050.....	13
Approved geology elective.....	3
	31

SENIOR YEAR	SEM. HRS.
Petroleum Engineering 4045, 4046, 4051, 4056, 4058, 4059, 4060, 4998, 4999... ..	17
General education arts/humanities/social sciences courses*.....	12
Petroleum engineering design elective.....	3
	32

CURRICULUM IN PETROLEUM ENGINEERING

TOTAL SEM. HRS. • 130

Mathematics 1550, 1552, and Physics 2101, 2102 each requires a grade of "C" or better before a student may register for any 3000-level petroleum engineering course. Also, credit must be earned in PETE 3053 before a student may register for any 4000-level petroleum engineering course.

A student may elect to take six sem. hrs. of ROTC in place of Petroleum Engineering 1010, 2060, and CM 1030. The six sem. hrs. of ROTC must be successfully completed before any substitution will be made.

General education required courses ().*

FRESHMAN YEAR	SEM. HRS.
Chemistry 1201,* 1202,* 1212.....	8
English 1001*.....	3
Geology 1001, 1003, 1601.....	7
Mathematics 1550,* 1552*.....	9
Petroleum Engineering 1010 or ROTC....	2
Construction Management 1030 or ROTC.	2
Life science elective*.....	3
	34

SOPHOMORE YEAR	SEM. HRS.
Civil Engineering 2450.....	3
Electrical Engineering 2950.....	3
Mathematics 2065.....	3
Industrial Engineering 3302.....	3
Petroleum Engineering 2031, 2032, 2034, 2060.....	9
Physics 2101,* 2102.....	6

CRAFT & HAWKINS DEPARTMENT OF PETROLEUM ENGINEERING

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 PROFESSORS • Bassiouni, Langlinois, Sears, Wojtanowicz
 ASSOCIATE PROFESSOR • Hughes, Rao, Smith, White
 ASSISTANT PROFESSOR • Kam, Tyagi

The program's educational objectives are to:

- Develop engineers who understand and are able to apply petroleum engineering tools and concepts in the following areas: reservoir engineering, rock properties and well logging, drilling and completions, and surface facilities.
- Produce engineers who have the ability to communicate orally and in writing.
- Produce engineers who have the knowledge and skills in other areas (mathematics, geology, physical sciences and other engineering disciplines) to work effectively as petroleum engineers.
- Develop engineers who understand the ethical expectations of a petroleum engineer by society, employers, and other stakeholders.