COLLEGE OF Engineering

PIUS J. EGBELU, Bert S. Turner Endowed Professor, Dean

JULIUS P. LANGLINAIS Associate Dean

MEHMET T. TUMAY Associate Dean for Research and Graduate Studies

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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 biological 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 eight degree-granting departments, the Hazardous Materials Research Center, the Hazardous Waste Research Center, the Louisiana Transportation Research Center, the Water Resources Research Institute, the Institute for Recyclable Materials, and the Remote Sensing and Image Processing Laboratory. Activity within the college is located in the Center for Engineering and Business Administration (CEBA) Building. 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, ENGL 3700, IE 3201, IE 4462, and PETE 3025 may be taken. More stringent requirements may be imposed by individual departments. Refer to the curricular requirements of each department. Construction Management students must earn a minimum grade of “C” in MATH 1441.

English proficiency is defined as a grade of “C” or better in all required English courses in each student’s curriculum (ENGL 1001, 1002, and, if required, ENGL 3002).

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 (engineering students) or credit in MATH 1441 with a grade of “C” or better (construction management students).

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

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<th>Departments</th>
<th>Curricula</th>
<th>Degrees</th>
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<td>Biological Engineering</td>
<td>Bachelor of Science in Biological Engineering</td>
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<tr>
<td>Gordon A. &amp; Mary Cain Department of Chemical Engineering</td>
<td>Chemical Engineering</td>
<td>Bachelor of Science in Chemical Engineering</td>
</tr>
<tr>
<td>Civil &amp; Environmental Engineering</td>
<td>Civil Engineering</td>
<td>Bachelor of Science in Civil Engineering</td>
</tr>
<tr>
<td></td>
<td>Environmental Engineering</td>
<td>Bachelor of Science in Environmental Engineering</td>
</tr>
<tr>
<td>Construction Management</td>
<td>Construction Management</td>
<td>Bachelor of Science in Construction Management</td>
</tr>
<tr>
<td>Electrical &amp; Computer Engineering</td>
<td>Electrical Engineering</td>
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<td>Industrial &amp; Manufacturing Systems Engineering</td>
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<td>Mechanical Engineering</td>
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<td>Bachelor of Science in Mechanical Engineering</td>
</tr>
<tr>
<td>Craft &amp; Hawkins Department of Petroleum Engineering</td>
<td>Petroleum Engineering</td>
<td>Bachelor of Science in Petroleum Engineering</td>
</tr>
</tbody>
</table>

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 ME 3333 for mechanical engineering; and EE 2950, 3950, and 3951 for electrical or computer engineering). 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 engineering courses or approved technical electives at the 3000 or 4000 level. Engineering students must complete nine hours of these courses at the 4000 level in the major; construction management students must complete nine hours of these courses 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 adviser 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. 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. 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. If students are to be simultaneously enrolled in campus and correspondence courses, enrollment in correspondence courses must be
completed by the final date for adding courses, including the summer term. The deadline for completion of all correspondence course work is the last day of classes for the semester during which the student is enrolled.

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.

- 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, nonmajors must complete CM 1010 and CM 2012, and 12 additional hours of CM courses. Students must declare construction management as a minor in their respective college prior to taking any CM courses numbered above 2121. Students must also adhere to the departmental and college policy for “D” grades and repetition of courses.

- 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, 3110, 4153; CHE 4253 or EVEG 4105; and three 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 2753, 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 4463 and two 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 Industrial & Manufacturing Systems 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, 4362, 4433, and 4540 and two courses from the following: IE 4485, 4490, 4785, 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 Industrial & Manufacturing Systems Engineering.

- 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 ENGL 3002, PSYC 2000, ACCT 2000 or 2001, FIN 3201, IE 3201, MGT 3200, MKT 3401, and CMST 1061, 2010, or 2061. An overall gpa of 2.00 in these courses is required.

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.

Any interested student must contact a counselor in the college to declare the intended minor and select additional required courses.

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 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 (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

Phi Kappa Phi, a national scholastic honor society founded in 1897, now contains 282 chapters nationwide. It is one of the most prestigious scholastic honor societies in the U.S. The LSU chapter was founded in 1930 as the 43rd chapter in the nation. At the present time, the national office is located on this campus in the French House.

The primary objectives of Phi Kappa Phi are to promote the pursuit of excellence in higher education and to recognize outstanding achievement by students and faculty through election to membership and through various awards and fellowships. 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 five percent and seniors and graduate students in the top ten 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.

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.

Transfer students must meet the above requirements in the selection of arts, humanities, and social sciences electives.

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.

Six hours of ROTC credit may be applied toward all degree programs as substitutions indicated in each curriculum listed below.

DEPARTMENT OF BIOLOGICAL & AGRICULTURAL ENGINEERING

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TELEPHONE • 225/578-3153
FAX • 225/578-3492

PROFESSORS EMERITI • Braud, Cochran, Lawson, Mayeux, Sister, Stipe, Verma, Wright
PROFESSORS • Bengtson, Branch, Brown, Hamman, Rester, Velupillai
ASSOCIATE PROFESSORS • Drapcho, Lima, Mailander
ASSISTANT PROFESSORS • Hall, Monroe, Price, Walker
ADJUNCT FACULTY • Fouss, Kornecki, Parish, Rein, Robbins, Rusch

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, environmental 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 materials 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

<table>
<thead>
<tr>
<th>Course</th>
<th>SEM. HRS.</th>
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<tbody>
<tr>
<td>Biological Sciences 1201, 1208</td>
<td>4</td>
</tr>
<tr>
<td>Biological Engineering 1290, 1252</td>
<td>4</td>
</tr>
<tr>
<td>Chemistry 1201, 1202*, 1203*</td>
<td>6</td>
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</tbody>
</table>
Chemistry 1212 ................................................................. 2
English 1000/1001, * 1002* .............................................. 6
Mathematics 1550, * 1552 ............................................... 9
Physics 2101* .................................................................. 3

**Sophomore Year**

**Sem. Hrs.**

-- Biological Engineering 2350, 2352 ........................................ 6
-- Biological Sciences 1202, 1209 ........................................ 4
-- Biological Sciences 2051 ................................................. 4
-- Civil Engineering 2450, 3400 ........................................... 6
-- Chemistry 2261 ............................................................. 3
-- Electrical Engineering 2950 ............................................ 3
-- Mathematics 2065 ........................................................ 3
-- Physics 2102* .................................................................. 3

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**Junior Year**

**Sem. Hrs.**

-- Biological Engineering 3340 ........................................... 3
-- Biological Engineering 4303, 4352 ..................................... 6
-- Biological Sciences 2083 ................................................. 3
-- Civil Engineering 2200 .................................................... 3
-- Civil Engineering 2282 or Mechanical Engineering 3133 ....... 3
-- English 3002 or ROTC .................................................... 6
-- Engineering design elective ............................................. 6
-- Mechanical Engineering 3333 .......................................... 3

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**Senior Year**

**Sem. Hrs.**

-- Biological Engineering 3190, 3320, 4290, 4292 .................. 8
-- Biological Engineering 3341 ............................................. 3
-- Engineering design electives .......................................... 3
-- General education arts/humanities/social sciences courses* ...... 18
-- Elective or ROTC ........................................................... 3

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**Gordon A. & Mary Cain Department of Chemical Engineering**

Chair • Knopf, Robert D. & Adele Anding Professor in Chemical Engineering

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**JAY AFFOLTER ENDOWED PROFESSOR • Corripio**

Robert D. & Adele Anding Professor of Chemical Engineering

**KNOFP**

BASF Endowed Professor • Dooley

Gordon A. & Mary Cain Professor • Cleij

Gordon A. & Mary Cain Professor and Chair • McCoy

Chevron Endowed Professor of Engineering • Reible

Jesse Coates Professor of Chemical Engineering • Thibodeaux

IKE East Professor of Chemical Engineering • Valsara

Clarence M. Eidt, Jr., Professor of Chemical Engineering • Podilaha

Robert Hughes Harvey Professor • Wornat

Paul M. Horton Professor of Chemical Engineering • Pike

F. J. Haydel, Jr./Kaiser Alumunium Professor • Wetzel

Malcolm C., Jr., & Gene Perdue Lowe Professor • Thompson

George H. Nusloch II Endowed Professor of Chemical Engineering

William G. Reymond Endowed Professor • Sterling

James McLaurn Shivers Endowed Professor • Spivey

Alessio & Marguerite Voorhies Endowed Professor • Harrison

Professors Emeriti • Groves, McLaughlin, Price

Professors • Corripio, Dooley, Griffith, Harrison, Hjortset, Knopf, McCoy, Pike, Reible, Sterling, Thibodeaux, Valsara

Associate Professors • Podilaha, Spivey, Thompson, Wetzel, Wornat

Assistant Professor • Cleij

Instructors • Cygan, Hadlock, Mowrey

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; big chemical 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 related 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, 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. Elective courses permit in-depth study in a particular area of chemical engineering. For example, students wishing to concentrate ultimately in pollution control, or in biological or materials engineering may plan their programs to give them a foundation in these fields. 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. & 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.** 131

**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 grade-point deficiency, and reminding them that a 2.00 or better grade-point average in all chemical engineering courses is required for the B.S.Ch.E. degree.

**Academic Probation** Any chemical engineering student whose cumulative grade-point average on all chemical engineering courses attempted is seven or more quality points below a 2.00 shall be placed on departmental scholastic probation until they have achieved a grade-point average 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 grade-point average in all chemical engineering courses is required for the B.S.Ch.E. 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 grade-point average 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 semester (fall or spring) following their dropping. 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.

A grade of "C" or better in each of the basic sciences preparatory courses completed—CHEM 1201 and 1202; PHYS...
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 a strong foundation in technical 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 socio-economic 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 from the senior year with emphasis on technical, socio-economic, and regulatory issues in environmental engineering. Alternatively, students may pursue the more specialized environmental engineering curriculum leading to the B.S. 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 a 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 programs;
- 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 B.S. 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

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, hydraulic, and 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 profession, 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 resources; 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 in Technical Field.

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 ENVIRONMENTAL ENGINEERING**

TOTAL SEM. HRS. • 134

Along with the College’s mathematics and physics proficiency requirements, Civil Engineering students must earn a grade of “C” or better in CE 2450 before registering for CE 2200, CE 3400, and CE 2460.

General education required courses(*).

**FRESHMAN YEAR**

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<thead>
<tr>
<th>Subject</th>
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<tr>
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**SOPHOMORE YEAR**

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<tr>
<td>Mathematics</td>
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**JUNIOR YEAR**

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**CURRICULUM IN CIVIL ENGINEERING**

TOTAL SEM. HRS. • 128

General education required courses (*).

**FRESHMAN YEAR**

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<td>Mathematics</td>
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<tr>
<td>Physics</td>
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**SOPHOMORE YEAR**

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<td>Chemistry</td>
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**JUNIOR YEAR**

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<tr>
<td>English</td>
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</table>
DEPARTMENT OF CONSTRUCTION MANAGEMENT

CHAIR • Hammitt, Associate Professor
OFFICE • 2519 CEBA Building
TELEPHONE • 225/578-5754
FAX • 225/578-8752

BUOET & LEBLANC, INC., DISTINGUISHED PROFESSOR OF COMMERCIAL CONSTRUCTION • Householder
CONTRACTORS’ EDUCATIONAL TRUST FUND CHAIR • Gill
CONTRACTORS’ EDUCATIONAL TRUST FUND PROFESSORSHIP FOR APPLIED PROFESSIONAL ETHICS • Gill
PROFESSORS • Gill, Householder
ASSOCIATE PROFESSORS • Dishongh, Hammitt, Kinchen, Nethken, Rosso
ASSISTANT PROFESSOR • Raider
INSTRUCTORS • Davis, Dean
PROFESSIONAL-IN-RESIDENCE • Patin

The Department of Construction Management offers the degree of Bachelor of Science in Construction Management. The department is accredited by the American Council for Construction Education. The department recognizes that its 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.

ELIGIBILITY REQUIREMENTS

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

“D” GRADES AND REPETITION OF COURSES

Students must pass all CM prerequisite courses with a grade of “C” or better. (See College Policy for “D” Grades and Repetition of Courses in this section of the catalog.)

CURRICULUM IN CONSTRUCTION MANAGEMENT

A grade of “C” or better is required in ENGL 1000/1001, 1002, and 2002 and MATH 1441; PHYS 2001 and 2002. General education required courses are marked with asterisks (*).

TOTAL SEM. HRS. • 127

FRESHMAN YEAR SEM. HRS.
Construction Management 1010, 1400 or approved computer elective, 2012 • 9
English 1000/1001, * 1002* • 6
Experimental statistics 2201* • 4
General education arts course* • 3
General education humanities course* • 6
Geology 1001* • 3
Mathematics 1441* • 3

SOPHOMORE YEAR SEM. HRS.
Accounting 2000 or 2001, 2101 • 6
Construction Management 2121, 2131, 2502 • 9
Economics 2010* or 2030* • 3
English 2002 • 3
Physics 2001, * 2002* • 6
General education speech communication course* • 3
General education science courses • 3

JUNIOR YEAR SEM. HRS.
Construction Management 3002, 3121, 3131, 3141, 3301, 3302, 3501, 3502 • 24
Approved electives or ROTC • 6

SENIOR YEAR SEM. HRS.
Civil Engineering 3700 • 1
Construction Management 3504, 4200, 4201, 4202, 4400 • 15
Finance 3201 • 3
Industrial Engineering 3201, 4462 • 6
Approved business/management electives • 6

DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

INTERIM CHAIR • Zhou, Oskar R. Menton
ENDOWED PROFESSOR OF ELECTRICAL ENGINEERING • Zhou

CHEVRON ENDOWED PROFESSOR • El-Amawy
McDERMOTT INTERNATIONAL, INC. ENDOWED PROFESSOR • Ajmera
OSKAR R. MENTON ENDOWED PROFESSOR IN ELECTRICAL ENGINEERING • Zhou
PROFESSORS EMERITI • Kinney, Marshak, Voss
PROFESSORS • Ajmera, Aravena, Czarnecki, El-Amawy, Feldman, Gu, Harlow, Kak, Mendrela, Rai, Ramanujam, Zhou
ASSOCIATE PROFESSORS • Koppelman, Nargarhi-Pour, Skavantzos, Srivastava, Trahan, Vaidyanathan
ASSISTANT PROFESSORS • Liang, Wu
INSTRUCTORS • Audifred, De Souza, Rabalais, Scalzo

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 department office.

General education required courses (*).

**FRESHMAN YEAR**  
Chemistry 1201*  
English 1000/1001,* 1002*  
Mathematics 1550,* 1552*  
Physics 2101,* 2108  
General education arts/humanities/social sciences courses*  
Communication studies 2061 or ROTC

**SOPHOMORE YEAR**  
Computer Science 1253, 1254  
Electrical Engineering 2120, 2130, 2230, 2231, 2710, 2720, 2730

**JUNIOR YEAR**  
Electrical Engineering 2731, 3120, 3140, 3220, 3221, 3320, 3410, 3530, 3750, 3751

**SENIOR YEAR**  
General education arts/humanities/social sciences courses*

Approved engineering (nonelectrical) elective

General education arts/humanities/social sciences courses*

Approved electrical engineering design electives

**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**  
Chemistry 1201*  
English 1000/1001,* 1002*  
Mathematics 1550,* 1552*  
Physics 2101,* 2108  
General education arts/humanities/social sciences courses*  
Communication studies 2061 or ROTC

**SOPHOMORE YEAR**  
Computer Science 1253, 1254  
Electrical Engineering 2120, 2130, 2230, 2231, 2710, 2720, 2730

**JUNIOR YEAR**  
General education arts/humanities/social sciences courses*

**SENIOR YEAR**  
General education arts/humanities/social sciences courses*

Approved electrical engineering design electives

**DEPARTMENT OF INDUSTRIAL & MANUFACTURING SYSTEMS ENGINEERING**

**CHAIR** • Ray, Associate Professor  
**OFFICE** • 3128 CEBA Building  
**TELEPHONE** • 225/578-5112  
**FAX** • 225/578-5109

**EDWARD McLAUGHLIN PROFESSOR OF ENGINEERING** • Egbelu

**BERT S. TURNER ENDOWED PROFESSOR** • Knapp

**FRED B. & RUTH B. ZIGLER ENDOWED PROFESSOR** • Knapp

**PROFESSOR EMERITUS** • Zohdi

**PROFESSORS** • Egbelu, Liao, Mann, Sarker, Triantaphyllou, Webster

**ASSOCIATE PROFESSORS** • Aghazadeh, Knapp, Ray

**ASSISTANT PROFESSORS** • Harvey, Jiang, McAllister

Industrial engineering involves the synthesis and application of scientific principles to design, installation, and improvement of integrated systems of people, materials, 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 work systems measurement, methodology development and improvement, CAD, CAM, CIE systems development integration and applications, expert systems, ergonomics and human factors engineering, safety engineering, reliability engineering, quality assurance, statistical analysis and control, facilities and plant layout, new product development and value engineering, concurrent engineering and project management, engineering economy, production planning and control, manufacturing processes, computer modeling and simulation, industrial automation and robotics, materials handling, cost and budgetary control, and operations research studies.

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 all kinds of jobs and the machines and people who produce goods; and the ability to analyze, synthesize, and integrate technical knowledge in practical ways.

Industrial engineers' backgrounds, experience, and training give them wide acquaintance with industrial problems. Recent developments, such as widespread industrial interest in systems design, expert/AI systems, concurrent engineering, information systems, and CIE/CIM have made the industrial engineers' entrance into management even more likely, for their training gives familiarity with qualitative and quantitative methods of systems interaction and control. At present, the demand for industrial engineers exceeds the supply, thus assuring job opportunities, with expanded opportunities expected for the future.

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

The program educational objectives are:
- 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. • 133

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

General education required courses (*).

**FRESHMAN YEAR**  
Chemistry 1201,* 1202*  
Construction Management 1030

**Industrial Engineering 1002**  
English 1000/1001, 1002

**Mathematics 1550,* 1552**  
Physics 2101,* 2108

**Communication studies 1061 or ROTC** • 2-3

**SOPHOMORE YEAR**  
Chemistry 1212*  
Civil Engineering 2450

**Economics 2030**  
Electrical Engineering 2950

**Industrial Engineering 2060, 3302**  
Mathematics 2090

**Mechanical Engineering 2733**  
Physics 2102, 2109

**General education arts, humanities, social sciences courses** • 6
Develop engineers who have critical thinking skills to identify opportunities, solve problems, and make decisions in the presence of uncertainty and economic considerations.

Produce engineers who are effective communicators with the ability to convey and acquire technical ideas, information, and recommendations to and from peers, employers, and the public.

Produce engineers who can use and apply basic, petroleum and design principles, have been exposed to current and emerging technologies, and have the ability to pursue life long learning.

Produce engineers who are exposed to professional ethics and who have a commitment to public welfare and the environment.

Although the petroleum engineering curriculum is designed primarily for careers in the drilling and production aspects of 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.

The program educational objectives are:

- Develop engineers who have critical thinking skills to identify opportunities, solve problems, and make decisions in the presence of uncertainty and economic considerations.
- Produce engineers who are effective communicators with the ability to convey and acquire technical ideas, information, and recommendations to and from peers, employers, and the public.
- Produce engineers who can use and apply basic, petroleum and design principles, have been exposed to current and emerging technologies, and have the ability to pursue life long learning.
- Produce engineers who are exposed to professional ethics and who have a commitment to public welfare and the environment.

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).
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 curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

**CURRICULUM IN PETROLEUM ENGINEERING**

**TOTAL SEM. HRS. • 131**

**FRESHMAN YEAR**

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**SOPHOMORE YEAR**

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<td>Petroleum Engineering 2031, 2032, 2034</td>
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**JUNIOR YEAR**

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*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 3002 and 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, 1060, 3037. The six sem. hrs. of ROTC must be successfully completed before any substitution will be made. The sequence in which elective courses are taken may have to be altered for students electing the ROTC option.

The arts/humanities/social sciences electives must be selected from the approved list published by the dean of the College of Engineering.

A student may elect to take six semester hours of Economics 2010, 2020 in place of three semester hours of Economics 2030. The additional three hours may be used to partially fulfill the general education requirement.

General education required courses (*).