

College of Engineering and Science

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Minority Engineering and Cooperative Education

Programs

Leona Ford, Director

History and Organization

Engineering education at Louisiana Tech University began in 1895 with a two-year program in Mechanic Arts. In 1910 this program was expanded to a Bachelor of Industry degree in General Engineering. Four-year engineering curricula developed as follows: 1921-BS in General Engineering; 1927-BS in Mechanical-Electrical and BS in Civil Engineering; 1938-BS in Mechanical and separate BS in Electrical Engineering; 1940-BS in Chemical Engineering; 1948-BS in Petroleum Engineering; 1957-BS in Industrial Engineering; 1972-BS in Biomedical Engineering; and 1986-BS in Computer Engineering.

Other bachelors degrees developed as follows: 1953-Geology; 1968-Construction Engineering Technology; 1968-Computer Science; and 1972-Electrical Engineering Technology.

Graduate education began in 1958 with the Master of Science degree (Engineering and Geology). In 1968 the Ph.D. degree in Engineering was offered. In 1973 the Ph. D. in Biomedical Engineering was offered. In 1979 the practice-oriented Doctor of Engineering was offered. In 1980 the Master of Science in Computer Science was offered. In 1996 the School of Science which included mathematics, chemistry, and physics, was merged with the College of Engineering to form the College of Engineering and Science.

In 1998, the Ph.D. in Engineering was approved and began enrolling students.

The vision, mission, and guiding principles for the College of Engineering & Science are as follows:

The Vision

We will be the college of choice in this region for students in engineering and science.

The Mission

- We provide a quality undergraduate and graduate education that responds to the needs and challenges of our ever-changing world, includes an international perspective, and stimulates social and ecological awareness.
- We promote the knowledge, skills, ethics, creativity and critical thinking necessary for professional competence and life-long learning.
- We conduct quality research throughout the college and world-class research in key focal areas.

Guiding Principles

- We consider the success of our students to be the primary standard for our success.
- We will provide an exciting environment that allows all students, faculty, and staff to attain their maximum potential.
- We will exhibit integrity, respect, and dignity in every aspect of our conduct.
- We will instill a spirit of pride, cooperation, and accountability in all that we do.
- We believe that teaching, research, and professional service are mutually supportive in the search for excellence.

Accreditation

All engineering programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), and both four-year engineering technology programs are accredited by the Technology Accreditation Commission of ABET. The Computer Science program is accredited by the Computer Science Accreditation Commission (CSAC) of the Computing Sciences Accreditation Board (CSAB), a specialized accrediting body recognized by the Council on Post Secondary Accreditation (COPA) and the U. S. Department of Education.

Undergraduate Degrees

Bachelor of Science degrees are offered in biomedical engineering, chemical engineering, chemistry, civil engineering, computer science, construction engineering technology, electrical engineering, electrical engineering technology, geology, industrial engineering, mathematics, mechanical engineering, and physics.

High School Preparation

The best high school preparation for a student planning to enroll in a curriculum offered by the College of Engineering and Science is listed below:

English, 4 units; Algebra, 2; Plane Geometry, 1; Trigonometry, 1; Chemistry, 1; and Physics, 1.

Dual Bachelor of Science Degrees with Grambling State University

Students at Louisiana Tech University and Grambling State University have the opportunity of simultaneously pursuing two Bachelor of Science degree programs, one at Tech and one at Grambling. Grambling's B.S. degree in Drafting Technology is coordinated with Tech's B.S. degree in Civil Engineering. Grambling's B.S. degree in Electronics Technology is coordinated with Tech's B.S. degree in Electrical Engineering.

A student who wishes to enroll for either of these dual programs may do so by declaring his/her intention when applying for admission. Transfer students are allowed to enter these programs at any registration at either of the universities.

To qualify for a B.S. degree at Grambling and a B.S. degree at Tech, a student must complete all courses required by the Department of Industrial Education at Grambling and the courses required by the appropriate engineering department at Tech. Courses that are common to both degree programs and that are offered at both universities may be taken at either university.

Admissions

Students who meet the University admissions criteria will be admitted to the College of Engineering and Science.

International Students

International students will be subject to the same admission requirements as other students. However, no baccalaureate program in the College of Engineering and Science will permit its enrollment of international students to become larger than 15% of the program's total enrollment in the previous Fall Quarter. When international applicants exceed this limit, they will be selected for admission competitively on the basis of scholastic achievement.

Transfer Students

Candidates for admission to the College of Engineering and Science who have studied at another institution of higher education must submit an official record of that study to Louisiana Tech University. This record will be evaluated by the program in which the candidate wishes to major. The evaluation will determine which curricular requirements of the intended program of study at Louisiana Tech have been satisfied by the student's prior study. Students must have an overall grade point average of at least 2.0 out of 4.0 in all courses for which transfer credit is allowed.

Scholastic Requirements

Students in the College of Engineering and Science are subject to the scholastic standards of the University regarding probation, suspension, and readmission. Program chairs may approve workload restrictions intended to restore the quality of the student's work to the standards required by the College of Engineering and Science.

Students in the College of Engineering and Science must earn a grade of "C" or better in any math course which is a prerequisite for other courses. Students must also earn a grade of "C" or better in ENGR 120, 121, 122; CHEM 100, 101, 103; and PHYS 201 prior to taking courses for which these are prerequisites.

Students on scholastic probation and those returning from a period of suspension are limited to a maximum of 9 semester hours per quarter.

Electives

All electives must be approved by the appropriate program chair.

Credit by Examination

Students of exceptional scholastic achievement are allowed to take subject credit examinations in some of the courses required for a degree. The University has specific regulations controlling subject examinations, and these regulations are printed elsewhere in this Bulletin. A student in the College of Engineering and Science may earn up to a maximum of 30 semester hours by credit examination. The College of Engineering and Science will not accept any credits earned by passing the CLEP General Examination.

Correspondence Courses

Students in the College of Engineering and Science are permitted to include no more than six semester credit hours of correspondence courses for credit toward graduation in any curriculum. Prior to pursuing the correspondence work, the student must obtain written approval of the Associate Dean for Undergraduate Studies of the College of Engineering and Science. Approval will be granted only for courses in humanities or social sciences. (All English courses are excluded.)

Graduation Requirements

All requirements listed in the General Information section of this Bulletin apply. In addition, a student majoring in a program in the College of Engineering and Science must have at least a 2.0 grade point average in courses bearing the specific rubric of the major program (e.g., computer science, civil engineering). In order to graduate from a baccalaureate program in the College of Engineering and Science, a student must complete 27 of the last 36 hours in the curriculum while enrolled in the College of Engineering and Science.

Ethical Standards

Students in the College of Engineering and Science are preparing to enter a profession which demands high ethical standards of its members. Honesty and high ethical standards are demanded of these students and all others taking courses conducted in the College of Engineering and Science. It is the student's right and responsibility to discourage and report academic misconduct. The failure to do so is a breach of ethical standards.

Academic misconduct is a serious breach of ethics in academic activities, such as examinations, reports, and homework. It may occur in any of the following forms:

1. Giving or receiving unauthorized aid;
2. Stealing or plagiarizing the substance, work, or ideas of others;
3. Lying, using evasive statements, or concealing the truth behind technicalities.

Student-written computer programs and data are not to be shared with other students without the specific authorization of the responsible faculty. Students are responsible for protecting their disks from unauthorized access.

The determination of academic misconduct will be made in accordance with the University's "Academic Misconduct" section of this Bulletin.

Repeated occurrences of academic misconduct are specifically contrary to the standards of personal integrity required by the professions connected with the programs in the College of Engineering and Science. Therefore, a stronger penalty may be awarded for repeated commissions of academic misconduct, including dismissal from the College of Engineering and Science.

Undergraduate Research Opportunities

Academically qualified undergraduate students have an opportunity to gain experience on campus by working part-time as

a member of a research team including faculty and graduate students. Compensation is competitive with most local employment and entails the major advantage of providing on-campus stimulating work experience to enrich the student's total educational experience.

The qualifications required for participating include the following:

1. Students must be enrolled in a degree program in the College of Engineering and Science, and must be in good academic standing.
2. Students must have an overall grade point average of 2.7 or better.

Students are selected by the faculty responsible for the various research projects offering the employment.

Applicants will automatically be considered for suitable employment on research projects throughout the college regardless of the department in which they are enrolled.

The Cooperative Education Program

The College of Engineering and Science is cooperating with certain industrial firms in a plan of alternate periods of work and University study for students in engineering and science. The Cooperative Education Program provides one of the best methods for integrating technical theory and practical industrial experience.

Although the College of Engineering and Science cannot guarantee work or stipulate compensation, an effort will be made to place the students in jobs having the most favorable education and financial possibilities. The Cooperative Education Program will allow the student to have approximately one year of practical experience by the time of graduation. If the student accepts permanent employment with the cooperating company, the necessity for taking special company orientation and training courses after graduation is usually eliminated. The Cooperative Education Program does not obligate the graduate to accept employment with the cooperating company, nor does it obligate the company to offer permanent employment to the graduate.

Each student participating in the Cooperative Education Program is required to register at Louisiana Tech during each work period.

Students from any academic program within the College of Engineering and Science will be considered for participation in the Cooperative Education Program provided they have successfully completed 45 semester credit hours of University work with a grade point average of at least 2.7. Requirements for graduation and the degree earned are the same as those for regular students. Individuals interested in further details should contact the Director of the Cooperative Education Program, College of Engineering and Science, Louisiana Tech University, Ruston, LA 71272.

Student Organizations

The following national organizations have student chapters on campus: American Chemical Society, Biomedical Engineering Society, American Institute of Chemical Engineers, American Society of Civil Engineers, Association for Computing Machinery, Institute of Electrical and Electronics Engineers, Instrument Society of America, Institute of Industrial Engineers, American Society of Mechanical Engineers, Associated General Contractors of America, Institute of Transportation Engineers, Association of Electrical Engineering Technologists, Society of Automotive Engineers, North American Society for Trenchless Technology, National Society of Black Engineers, Society of Physics Students, Society of Women Engineers, American Society of Heating, Refrigeration, and Air Conditioning Engineers.

Student Honor Societies

The following honor societies are available to those students who excel academically and are elected to membership:

- All Engineering--Tau Beta Pi

- All Technology--Tau Alpha Pi
- Biomedical Engineering--Alpha Eta Mu Beta
- Chemical Engineering--Omega Chi Epsilon
- Civil Engineering--Chi Epsilon
- Computer Science--Upsilon Pi Epsilon
- Electrical Engineering--Eta Kappa Nu
- Industrial Engineering--Alpha Pi Mu
- Mathematics--Pi Mu Epsilon
- Mechanical Engineering--Pi Tau Sigma
- Physics--Sigma Pi Sigma

Engineering and Science Scholarships

The scholarships listed under this section of the catalog are administered by the College of Engineering and Science and its individual programs. All scholarships are dependent on availability of funding and subject to cancellation or modification by the sponsor.

Butros Aukar Memorial Scholarship

A \$300 scholarship is provided for an outstanding student majoring in mechanical engineering or industrial engineering.

Associated General Contractors of America Scholarships

A \$1,000 scholarship is made available by the Louisiana Highway, Heavy, Municipal, and Utilities Branch of AGC to a student majoring in construction engineering technology. Students in construction engineering technology may also apply for scholarships through the AGC Shreveport Chapter and the National AGC, the Associated Builders and Contractors, Inc., and the Software Shops Systems.

David Michael Baker-Puffer Sweiven, Inc. Memorial Scholarships

One or more scholarships at \$1000 each are awarded to outstanding students majoring in chemical engineering at any level.

Ben T. Bogard Scholarship

Scholarships awarded as availability of funds permit to outstanding engineering students who have completed at least 6 quarters and 92 semester credit hours at Louisiana Tech, but have at least 3 quarters remaining before graduation. The award is based on scholarship, character, leadership, and need.

Frank Bogard Scholarship

Scholarships awarded as availability of funds permit to engineering students having completed at least 3 quarters and 60 semester credit hours at Louisiana Tech, but not more than 91 semester credit hours at the beginning of the Fall Quarter. The award is based on scholarship, character, leadership, and need.

Robert V. Byrd Scholarship

Scholarships awarded as availability of funds permit to engineering students maintaining a grade point average of 3.0 or better.

Ronald E. Cannon Endowed Scholarship

Scholarships awarded based on academic excellence to students pursuing a degree in an engineering discipline applicable to the natural gas and gas processing industry.

Chemical Engineering Scholarships

Scholarships are available to sophomore, junior, and senior students. Recipients are chosen on the basis of need, scholarship, and leadership. Participating companies include Dow Chemical, Exxon, PPG Industries, Union Carbide, UOP, Chevron, Ethyl, Monsanto, Copolymers, and Fluor Daniels. Scholarships are usually \$600 per year.

Chevron Scholarship

Two \$1000 scholarships are awarded to junior or senior students majoring in mechanical engineering. Recipients must be U. S. citizens or holders of permanent resident visas.

Civil Engineering Scholarships

Scholarships are available to sophomores, juniors, and seniors in civil engineering. Recipients are chosen based on academic ability, extracurricular activities, leadership potential, and financial need. Scholarship amounts vary.

Loyd Ray Click Memorial Scholarship

The Shreveport Chapter of the Construction Specifications Institute awards an annual \$500 scholarship to a sophomore, junior, or senior student majoring in architecture, interior design, landscaping, civil, mechanical, or electrical engineering, or construction engineering technology. The award is based upon academic excellence, financial need, and character. The Selection Board is composed of an Architectural Department faculty member, an Engineering Department faculty member, and a member of the Shreveport CSI Chapter.

Edward C. Darling Endowed Memorial Scholarship

A scholarship is awarded as availability of funds permit to a civil engineering student registered full-time with a minimum 3.0 GPA.

Desk and Derrick Club Scholarship

An annual scholarship is provided for a student majoring in geosciences.

Dow Chemical Outstanding Junior Chemical Engineering Award

A \$1,000 award is given to the top junior in chemical engineering. The recipient is chosen on the basis of scholarship and leadership. Selection is made by the Student Chapter AIChE officers and chemical engineering faculty.

Charlie Earl Scholarship

A scholarship is awarded as availability of funds permit a student majoring in mechanical engineering with particular preference being given to those who are married.

Eastman Minority Scholarships

Scholarships in the amount of 100 percent of tuition and fees are awarded to sophomore, junior, and senior minority engineering students. Preference is given to those who rank in the upper 25 % of their class. The award may be continued through the senior year.

Eastman Scholars Award

Scholarships based on academic excellence includes \$4000 awarded to a junior in chemical engineering for senior year expenses, together with a summer internship at Eastman. The students must be a U. S. citizen and rank in the top 10% of their class.

Engineering Alumni Scholarships

Derived from contributions by engineering alumni and their employers, scholarships are awarded each Fall to incoming freshmen students in the College of Engineering and Science. These awards are based on ACT and National Merit scores and high school records. The student must maintain a grade point average of 3.0 and remain in good standing in the College of Engineering and Science.

Oliver Woodrow Fisher Memorial Scholarships

Scholarships in the amount of \$1,000 each are awarded annually to students majoring in construction engineering technology, electrical engineering, and mechanical engineering.

Ben F. Freasier Memorial Scholarship

The Ben F. Freasier Memorial Scholarship is awarded by the College of Engineering and Science, chemistry program, to a junior or senior chemistry major. Special consideration will be given to a student whose interests include using the latest computer technology in conjunction with the science of chemistry, especially in monitoring and/or controlling chemistry laboratory experiments.

The award was established by the family and friends of the late Dr. Ben F. Freasier who taught chemistry for over twenty years at Louisiana Tech University. He was a visionary in the field of computer technology.

Buford Echols Gatewood Scholarship

A scholarship is awarded as availability of funds permit to a student majoring in mechanical engineering. Recipient must maintain a 2.5 or better grade point average.

Thomas Harper Goodgame Scholarship

A scholarship is awarded to a student enrolled in a curriculum in the College of Engineering and Science with a minimum 2.5 grade point average.

J. R. Harrelson Memorial Engineering Scholarship

Scholarship awarded as availability of funds permit to an incoming freshman who is a graduate of Woodlawn High School in Shreveport, LA with a minimum GPA of a 3.0 and accepted into the College of Engineering and Science. This scholarship is available for four years. Student must maintain a 2.75 GPA.

Mendal Heller Memorial Scholarship

A \$400 scholarship is provided by the Ark-La-Tex Section of ASME for an outstanding student majoring in mechanical engineering.

Mark David Hill Scholarship

Scholarship awarded to an outstanding student majoring in mechanical engineering.

David E. Hogan Endowed Scholarship

Scholarships awarded based on academic excellence to students pursuing a degree in an engineering discipline and demonstration of financial need.

John R. Horton Scholarship

Scholarship awarded to an outstanding student majoring in mechanical engineering.

Kaiser Aluminum Company Minority Scholarships

Approximately \$6,000 in scholarships are awarded each year for minority and women students majoring in chemical engineering and mechanical engineering. The number and amount of scholarships are determined by the faculty in the individual departments. Awards are renewable and are based on need and academic standing.

Thomas E. Landrum Memorial Scholarship

One scholarship is given to the outstanding senior in biomedical engineering.

Lazenby and Associates Scholarship

A \$1,500 scholarship is given each year to a student in civil engineering. The recipient is selected based on academic ability, extracurricular activities, leadership potential, and financial need.

McDermott Incorporated Scholarships

Two \$1,000 scholarships are provided for a junior and a senior majoring in civil engineering.

Robert E. McFadden Endowed Scholarship

Scholarships awarded as availability of funds permit to an incoming freshman admitted to the College of Engineering and Science who is a graduate of Captain Shreve High School in Shreveport, LA. Award will be based on financial need, teacher recommendations, college entrance test scores and minimum GPA of 2.5. (With growth in the principal, the decision *may* be made in the future to continue the scholarship into the sophomore, junior and senior years. If so, the student must maintain a 2.5 GPA.)

R. A. McFarland Memorial Scholarship

A scholarship is awarded as availability of funds permit to a civil engineering student who has been at Louisiana Tech for at least 2 years but has at least 3 quarters remaining before graduation. The recipient should rank in the upper one-fourth of his/her class among civil engineering students.

ME/IE Scholarship

Scholarship awarded to outstanding student majoring in mechanical or industrial engineering.

Mercedes Benz Scholarship

Two \$750 scholarships are awarded to students majoring in mechanical engineering.

Pipes Foundation Scholarship

Scholarships awarded to students pursuing a degree in an engineering discipline who maintain a 3.0 or better grade point average.

H. E. Ruff Physics Scholarship

Each year four scholarships of \$1200 each are awarded to freshmen physics majors. The scholarships are made possible through gifts from alumni and friends in honor of Dr. H. E. Ruff, former physics department head.

Donald Ruffin Endowed Scholarship

Scholarship will be awarded to a graduate of Oak Grove High School (LA) who is majoring in a curriculum in the College of Engineering and Science. Recipient must maintain a 2.5 GPA.

Maryanne Scogin Memorial Scholarship

Scholarship awarded as availability of funds permit to a student with a 3.0 GPA enrolled in Chemical or Mechanical Engineering.

Roy T. Sessums Memorial Scholarships

Four scholarships in the amount of \$1,000 are awarded each year on a stated rotation to two freshman and two graduate students majoring in civil, electrical, or mechanical engineering. Scholarships are awarded on the basis of scholarship, character, and leadership. The awards for underclassmen may be continued if the students remain enrolled in their chosen discipline of study and maintain a grade point average of 3.0 or better.

Dr. and Mrs. P. K. Smith, Sr. Endowed Scholarship Fund

Recipient shall be a junior majoring in a mathematics curriculum. Preference is that the award be to a graduate of a high school in Lincoln Parish.

Harrell R. and Lenore S. Smith Scholarship

Scholarships awarded as availability of funds permit to students chosen by the College of Engineering and Science Awards and Scholarships Committee.

Henry E. & Margaret A. Stamm Scholarship

Scholarships awarded based on academic excellence and demonstration of financial need.

Harry Talbot Scholarship

Scholarships awarded as availability of funds permit to engineering students with a grade point average of 3.0 or better who are U.S. citizens.

Jack Thigpen Scholarships

Approximately \$2,000 in scholarships are awarded each year to outstanding students in mechanical engineering. The number and amount of awards are determined by the mechanical engineering faculty.

Cengiz Topakoglu Outstanding Biomedical Engineering Student Scholarship

A \$1000 scholarship is awarded in the Fall to the outstanding student in biomedical engineering, based on contributions to the program and potential for contributions to the field. The selection is made by a committee of faculty and alumni.

Bruce Tucker Memorial Scholarship

A \$1,000 scholarship is awarded annually to a student majoring in construction engineering technology.

Charles G. Tullis Scholarship

A scholarship awarded to a student enrolled in a major in an area of Engineering in the College of Engineering and Science with a 2.0 grade point average.

Roy Wayne Vining-Dow Chemical Company Memorial Scholarship

Two or more \$1000 scholarships are awarded to outstanding chemical engineering students at any level, subject to renewal.

Calvin Watts Scholarship

A scholarship is awarded as availability of funds permit to a civil engineering student who has been at Louisiana Tech for at least two years. The recipient should rank in the upper one-fourth of his/her class among civil engineering students.

Whetstone Scholarships

A \$1,000 and a \$900 scholarship, sponsored by the R. Terral Whetstone family of Shreveport, are available to mechanical engineering students.

C. C. Whittelsey Scholarship

Scholarships awarded as availability of funds permit to students majoring in an engineering curriculum.

Thomas J. and Elizabeth B. Wilson Scholarship

Scholarships awarded as availability of funds permit to engineering students maintaining a grade point average of 2.5 or better. The award is based primarily on need with scholarship, character, and leadership being secondary considerations.

Samuel McCain Young Memorial Scholarship

An approximately \$750 scholarship is awarded each year by the Louisiana Engineering Society Ladies Auxiliary of New Orleans to a civil engineering student from the New Orleans metropolitan area. The award is based on need and academic record.

Engineering and Science Graduate Studies

The College of Engineering and Science offers the Master of Science with curricula available in biomedical, chemical, civil, electrical, industrial, and mechanical. The Master of Science is offered in computer science, chemistry, mathematics, and physics.

The Doctor of Philosophy degree is offered in applied computational analysis and modeling, in biomedical engineering, and in engineering (an interdisciplinary degree).

For information about graduate studies, see details in the graduate portion of this Bulletin, or contact the Associate Dean for Graduate Studies, College of Engineering and Science, Louisiana Tech University, Ruston, LA 71272.

Division of Continuing Engineering and Science Education

The Division of Continuing Engineering and Science Education sponsors and coordinates various special programs other than the regular academic and research programs. These include conferences, short courses, lectures, seminars, and continuing education programs. These programs are designed to aid practicing engineers, technicians, and others to keep abreast of the latest developments in the rapidly expanding technical fields. Some are offered regularly on a periodic basis while others are offered on demand. Anyone desiring the offering of any special course should contact the Director of Continuing Education, Louisiana Tech University, Ruston, LA 71272.

Undergraduate Programs

Biomedical Engineering

Biomedical engineering is formally defined as the application of engineering skills, principles, and tools to problems in biology and medicine. The undergraduate program at Louisiana Tech University combines the practical aspects of engineering with biology and medicine to produce an engineer capable of solving special kinds of problems. Biomedical engineers are alert and sensitive to the challenges of designing and using products for living systems and of studying these systems. The program provides medical and biological instruction in typical premedical courses (e.g., general biology, anatomy, physiology, organic chemistry) and engineering instruction in fundamental engineering courses. The biological training is integrated with the engineering training by means of a series of coordinated biomedical engineering courses taught at the sophomore, junior, and senior academic levels. In order to provide depth and focus in technical abilities, students specialize in one of the following traditional areas: chemical engineering, electrical engineering, or mechanical engineering. A separate track is available for pre-medical students.

Internships are available in both clinical and industrial environments. Interns experience breadth of interactions, procedures, and technology, and they complete significant engineering projects.

Biomedical engineers are working in many rewarding areas: for example, design and construction of artificial internal organs; design and application of the electronics and instrumentation associated with hospital operating rooms, intensive care units, and automated clinical laboratories; development and instrumentation of biomedical computer systems; the functional rehabilitation of disabled persons through appropriate application and development

of technology; clinical engineering; aerospace medicine and life science; basic research using engineering analysis principles aimed at understanding the basic mechanisms that regulate the human body. Employment opportunities for biomedical engineers exist in hospitals, rehabilitation engineering centers, national research foundations, governmental research institutions and agencies (e.g., NASA, FDA), chemical companies, pharmaceutical companies, hospital products companies, medical instrumentation and computer companies, orthopedic implant companies, and aerospace life science companies. Also, entrepreneurial activity in the health-related industries is prospering. Innovative medical and health care products can be manufactured and marketed by resourceful biomedical engineers. In industry, Louisiana Tech biomedical engineering graduates are responsible for manufacturing, quality control, research and development, management, and marketing.

One special feature of the Biomedical Engineering Program is that, upon or before graduation, students may complete the basic requirements necessary for admission to medical school. The program provides a strong quantitative background for one who wishes to pursue a future medical career. Another feature of the program is that, upon completion of the Biomedical Engineering degree program in any of the specialties, the student will be adequately prepared to continue his/her education at the graduate level by pursuing a Master of Science and/or the Doctor of Philosophy degree in Biomedical Engineering. Continued professional education in business, law, and the basic medical sciences is also possible.

Biomedical Engineering Program Objectives:

- To prepare graduates for employment as biomedical engineers, for graduate study in engineering or science or business, and for medical school. Career opportunities will include, but will not be limited to, clinical engineering, aerospace biomedical engineering, clinical practice as a physician, or any sector of the medical device industry. Our graduates will receive specific technical training in one of the following four areas: chemical engineering, electrical engineering, mechanical engineering, or pre-medical studies.
- To prepare graduates with skills that will enable them to be immediately productive in their chosen career. These tools include a knowledge of contemporary topics in medical technology, design experience, and professional experience appropriate to their post-graduation goal.
- To produce graduates who communicate effectively, who understand and undertake professional responsibilities, and who function effectively as members and leaders of multi-disciplinary teams.
- To produce graduates who believe that their undergraduate biomedical engineering education was a wise investment and who desire to continue to develop their knowledge and skills throughout their careers.

The curriculum in Biomedical Engineering is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Biomedical Engineering Curriculum (B.S.B.M.)

Freshman Year	
Natural Sciences (GER)	
Chemistry 100, 101, 102, 103, 104	8
English (GER)	6
Mathematics (GER)	
Mathematics 240, 241, 242	9
Engineering 120, 121, 122	6
Physics 201	3

Sophomore Year	
Natural Sciences (GER)	
Biological Sciences 225, 227	6
Arts (GER)	3
Biomedical Engineering 202, 203, 230	4
Engineering 220, 221, 222	9
Mathematics 243, 244, 245	9
Physics 202	3
	34
Junior Year	
Humanities (GER)	
English 201 or 202, and 303	6
Speech 377	3
Biomedical Engineering 225, 301, 325, 401, 425	15
Biological Science 321	1
Directed Electives*	6
	31
Senior Year	
Social Sciences (GER)	
Economics 215	3
Additional Social Science Courses	6
Humanities (GER)	
History	3
Biomedical Engineering 400, 402, 403, 404, 430, 435	12
Directed Electives	7
	31
Total Semester Hours	128
(GER): General Education Requirement (pg. 29)	
The Biomedical Engineering Program normally requires a "C" or better in any course in the College of Engineering and Science that serves as a prerequisite for another course.	
*Directed Electives chosen by students in consultation with faculty advisor from one of the following four concentrations:	
Pre-Medical**: Chemistry 250, 251, 252, 253, 254; Physics 261, 262: One 3 hr. 300- or 400-level elective in one of the engineering programs.	
Chemical Engineering: Chemical Engineering 213, 313, 353, 413, and one 3 hr. Chemical Engineering*** course at 300- or 400-level.	
Computer & Information: BIEN 310, CSC 220, 6 hours taken from CSC, CIS, or HIM at 300- or 400-level, with approval of advisor, 1 hr. lab elective with approval of advisor.	
Electrical Engineering: Electrical Engineering 232, 242, 335, 311, one 3 hr. Electrical Engineering*** course at the 300- or 400-level, or 1 hr. Electrical Engineering lab course, at 300- or 400-level.	
Mechanical Engineering: Mechanics & Materials 201, 211, 312, Mechanical Engineering 215, and two additional 3 hr. Mechanical Engineering *** courses at 300- or 400-level.	

**Students who wish to apply to medical school should be aware that they will need an additional course in Biological Sciences to meet medical school entrance requirements.

***An approved Biomedical Engineering course appropriate to this track may be substituted with consent of the student's advisor.

Chemical Engineering

The primary task of chemical engineers is the mastery of the industrial processes which chemically transform various natural resources into more useful and valuable products. These products range from paper and gasoline to medicines and computer microchips. The chemical engineer is constantly concerned with improving these processes to best conserve resources (including capital) while preserving and protecting the environment.

The education of the chemical engineer covers advanced chemistry, physics, mathematics, general engineering, computer applications, material balances, energy balances, chemical equilibria, thermodynamics, kinetics and reactor design, unit operations and transport processes, and process control, with laboratories emphasizing these areas along with oral and written communication skills.

In order to meet current career interests and opportunities, elective courses are offered in nuclear applications and safety,

industrial waste treatment, specialized computer techniques (including artificial intelligence), polymer engineering, pulp and paper processes, biochemical engineering, and fire and process safety. The curriculum in chemical engineering is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

The graduate in chemical engineering is particularly versatile. Industrial work may involve the production, operations, customer service, sales, or research departments of industries producing semiconductors, microchips, metals, paper, petroleum, petrochemicals, plastics, forest products, pharmaceuticals, or foods or the technical service or process improvement sections of such industries. Meaningful careers are also available with governmental agencies or private foundations associated with space, energy, and the environment. Graduate education in medical school, dental school, business school, law school, and chemical engineering are viable alternatives. At the undergraduate level, the purpose of the program is to provide a strong basic education such that the graduate will be prepared for all these options.

The Educational Objectives for the Chemical Engineering Program are:

- To prepare students for success and lifelong learning in their chemical engineering careers.
- To train students to develop skills in creative thinking, teamwork, problem solving, and chemical engineering design.
- To teach methods of problem analysis and solution techniques including math and computational skills appropriate to the chemical engineering profession.
- To train students in experimental methods and data analysis appropriate for chemical engineering applications.
- To engage students in the training and practice of technical oral and written communication.
- To permeate our educational program with an emphasis on the professional and ethical practice of chemical engineering both by example and explicit instruction.

The program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC-ABET). Graduates of this program may obtain a license for training in chemical engineering by passing the Fundamentals of Engineering exam. Subsequently, they may become registered as Professional Engineers upon completion of the appropriate time period of engineering training and by passing the Professional Engineers exam.

Chemical Engineering Curriculum (B.S.C.H.)

Freshman Year	
Natural Sciences (GER)	
Chemistry 100, 101, 102, 103, 104	8
English (GER)	6
Mathematics (GER)	
Mathematics 240, 241, 242	9
Engineering 120, 121, 122	6
Social Sciences (GER)	3
	32
Sophomore Year	
Engineering 220, 222	6
Chemical Engineering 202, 213, 254	7
Chemistry 250, 251, 252, 253	7
Mathematics 243, 244, 245	9
Physics 201	3
	32
Junior Year	
Humanities (GER)	
English 201 or 202, and 303	6
History	3
Social Sciences (GER)	

Economics 215	3
Chemical Engineering 304, 313, 332, 353, 413	13
Chemistry 311, 313	4
Engineering 221	3
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	32
Senior Year	
Arts (GER)	3
Natural Sciences (GER)	
Biological Sciences 101	3
Social Sciences (GER)	3
Chemical Engineering 402, 407, 430, 432, 434, 451	14
Directed Elective*	6
Humanities (GER) Speech 377 or English 463	3
<hr/>	
	32
Total Semester Hours	128

(GER): General Education Requirement (pg. 29)

The Chemical Engineering Program normally requires a “C” or better in any course in the College of Engineering & Science that serves as a prerequisite for another course.

*Directed Electives chosen by student in consultation with faculty advisor from courses offered in the College of Engineering & Sciences or the College of Applied and Natural Sciences. All electives must be approved by the Chemical Engineering Program Chair.

Chemistry

The chemistry curriculum offers a broad background in chemistry and results in a degree which is approved by the American Chemical Society. **Students who complete the curriculum without substitutions are eligible for Certification to the ACS.** Students entering this program generally plan to pursue a career as an industrial chemist or attend graduate school with a specialty in one of the major areas of chemistry (analytical, inorganic, organic, or physical).

Students who are interested in **pre-medicine, pre-dentistry, or biochemistry** may make the following substitutions:

Physics 209, 210 for Physics 201, 202; Humanities elective for English 303; Biological Sciences 131, 132, 133 and either 260 or 290 for Math 244, 245, 308; Biological Sciences 310 for Technical Elective; Biological Sciences 290 or 260 for Chemistry 466; Biological Science 315 or 422 for Chemistry 481; Chemistry 352, 353, 354, and one semester hour of science elective for Chemistry 409 or 420 or 424 (any two).

Chemistry Curriculum (B.S.)

Freshman Year	
Chemistry 100, 101, 102, 103, 104	8
English (GER)	6
Mathematics (GER)	
Mathematics 240, 241, 242	9
Social Science (GER)*	6
Natural Sciences (GER)	
Biological Sciences 130	3
<hr/>	
	32
Sophomore Year	
Chemistry 205	4
Chemistry 250, 251, 252, 253, 254	8
Chemistry 281	3
Mathematics 243	3
Natural Sciences (GER)	
Physics 201, 202, 261, 262	8
Arts (GER)	3
<hr/>	
	29
Junior Year	
Chemistry 311, 312, 313, 314	8
Chemistry 351	3
Humanities (GER)	
English 201 or 202 and 303	6
Mathematics 244, 245, 308	9
Technical Elective**	3
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Senior Year	
Chemistry 466, 481	7
Chemistry 409 or 420 or 424*** (any two)	6
Chemistry 498****	3
Chemistry 490*****	1
Humanities (GER)	
History (200 level)	3
Speech 377	3
Social Sciences (GER)*	3
Electives	5
<hr/>	
	31
Total Semester Hours	121

*Economics, geography, anthropology, political science, psychology, or sociology (minimum of two disciplines).

**Technical electives must be selected in consultation with a faculty advisor. Math 313 is recommended.

***In addition to the ACS core curriculum (Chem 466 and 481 are part of the core), the ACS certified B.S. requires six hours of 400-level courses that require Physical Chemistry (Chemistry 311, 312) as a prerequisite. If Chemistry 498 is used as a 400-level class for ACS certification, a written report that meets ACS standards for undergraduate research is required.

****Each senior student must conduct an undergraduate research Capstone Project which demonstrates integration and synthesis of chemistry skills. The duration of the Capstone Project must be two or more quarters.

*****Each senior student must submit a Career Portfolio notebook that documents major aspects of chemistry training and experience.

Requirements for a Minor in Chemistry

A minor in chemistry consists of Chemistry 100, 101, 102, 103, 104, and thirteen additional hours, of which nine must be 300- or 400-level. All courses applied toward the minor must be completed with the grade of “C” or higher.

Civil Engineering

Civil engineers are in the forefront providing constructive counsel on matters vital to mankind and the environment. Civil engineers are primarily responsible for planning, designing, and constructing all the world's constructed facilities. Most people can only talk about solving traffic congestion, environmental pollution, droughts, and floods. Civil engineers help to eliminate or greatly reduce the destructive effects of these events.

Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, the curriculum in civil engineering is designed to produce graduates who have the background necessary for the practice of civil engineering and the capacity for further development of mind and character to assume the highest responsibilities of citizenship and of professional engineering.

The up-to-date curriculum provides the fundamentals of engineering and teaches the application of those fundamentals in engineering analysis and design. It also helps the student acquire the ability to communicate, to develop a personal value system, and to have a sense of social responsibility and concern for the needs and welfare of mankind and the environment. Well-equipped laboratories enhance the classroom lectures: environmental engineering, hydraulics, materials testing, soil mechanics, structural testing, surveying, and transportation.

The student will gain some competence in all of the following areas with emphasis on at least one: structural design, environmental engineering, hydraulics, hydrology, surveying, transportation, soil mechanics, highways, and materials.

Civil Engineering Program Objectives:

- To develop the skills required to design civil engineering systems including the students' abilities to formulate problems, to think creatively, to synthesize information, and to work collaboratively in teams. The civil engineering

program at Louisiana Tech University will concentrate undergraduate instruction in areas of water resources/ environmental, structures, transportation, and geotechnical engineering.

- To train students thoroughly in methods of analysis, including the mathematical and computational skills appropriate for civil engineers to use when solving problems.
- To prepare students for life-long learning and successful careers as civil engineers.
- To teach students to use current experimental and data analysis techniques for civil engineering applications.
- To develop oral and written communication skills that allow students to present information effectively.
- To instill in our students an understanding of their professional and ethical responsibilities.

Civil Engineering Curriculum (B.S.C.V.)

Freshman Year

Natural Sciences (GER)	
Chemistry 100*, 101*, 103*	5
Physics 201*	3
English (GER)	
English 101, 102.....	6
Humanities (GER)	
History	3
Mathematics (GER)	
Mathematics 240*, 241*, 242*	9
Engineering 120*, 121*, 122*	6
	32

Sophomore Year

Humanities (GER)	
English 303, 463.....	6
Civil Engineering 202, 254.....	4
Engineering 220*, 221, 222.....	9
Mathematics 243*, 244*, 245.....	9
Mechanics & Materials 201, 211*.....	4
Physics 202	3
	35

Junior Year

Arts (GER).....	3
Natural Sciences (GER)	
Biological Sciences 101.....	3
Social Sciences (GER)	3
Civil Engineering 310, 324, 332, 333, 340, 341.....	17
Mechanics & Materials 312, 313*.....	5
	31

Senior Year

Humanities (GER)	
English (Literature).....	3
Social Sciences (GER)	6
Civil Engineering 314, 325, 411 or Structural Analysis & Design course, 439, 492, 493, 494	15
Directed Electives**.....	6
	30

Total Semester Hours 128

(GER): General Education Requirement (pg. 29)

*Grade of "C" or higher required.

**Directed Electives chosen by student in consultation with faculty advisor and approved by the Civil Engineering Program Chair.

Construction Engineering Technology

The program prepares the graduate for the responsibilities of managing and supervising all of the activities related to converting the plans and specifications prepared by engineers and architects into finished facilities. With increasing demand for economical service and continuous quality improvement, the construction

industry continues to improve its technology as well as its management efficiency.

The program provides technical and managerial education in that field of construction most closely aligned with engineering, with a particular emphasis on highway, heavy, and underground construction.

The four-year curriculum leading to the degree of Bachelor of Science in Construction Engineering is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology. It is in many ways similar to civil engineering but has the following major differences:

- Emphasis is on practical application of engineering science rather than upon the comprehensive understanding of the scientific theories.
- Considerable time is devoted to management and business administration courses.
- Less time is devoted to mathematics and the sciences.

Although not trained to become licensed professional engineers, graduates of this program are qualified to fill many professional positions in governmental agencies, industrial concerns, manufacturing companies of construction supplies and equipment, and in construction firms. These jobs may involve contract supervision, intermediate managerial responsibilities, inspection or sales, as well as the supervised design of construction projects. The undergraduate business and management training should help graduates move up the executive ladder to success.

On occasion courses in construction are shared with the Construction programs at Grambling State University and the University of Louisiana at Monroe.

The Construction Engineering Technology Program at Louisiana Tech University will:

- Develop the skills needed for entry level managerial or technical positions in the construction industry involving such functions as construction contract administration, direct construction supervision, cost estimating, scheduling inspection, surveying, material testing, sales or the supervised design of project components.
- Emphasize the skills needed for the heavy-highway, underground utility, and building structural frame construction segments of the industry.
- Educate students in methods of analysis needed to manage construction and solve problems as construction engineering technologists. Methods include:
 - a. Appropriate mathematical and computational methods
 - b. Construction cost and project cash flow analysis methods
 - c. Scheduling methods
- Prepare graduates to apply concepts, methods and principles needed for engineered construction practice.
- Prepare students for lifelong learning and successful careers in the construction industry.
- Develop oral and written communication skills that allow graduates to present and exchange information effectively and direct construction activity.
- Instill an understanding of professional, ethical and societal responsibilities.

Construction Engineering Technology Curriculum (B.S.C.T.)

Freshman Year

Natural Sciences (GER)	
Biological Sciences 101	3
Physics 209, 261	4
English (GER)	
English 101, 102.....	6
Mathematics (GER)	
Mathematics 111, 112	6
Business Law 255	3

Civil Engineering 254	3	
Civil Technology 100.....	3	
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	28	
Sophomore Year		
Humanities (GER)		
English 303	3	
Natural Sciences (GER)		
Physics 210, 262.....	4	
Social Sciences (GER)		
Economics 215	3	
Social Sciences courses	6	
Micro Computer Applications Electives (GER).....	3	
Mathematics 220.....	3	
Mechanics & Materials 206.....	3	
Statistics 200.....	3	
Accounting 201.....	3	
Architecture 301	2	
	<hr/>	
	33	
Junior Year		
Humanities (GER)		
Speech.....	3	
Management 201 plus an additional management course	6	
Chemistry 120.....	3	
Civil Engineering 436	3	
Civil Technology 210, 372, 373, 471, 473.....	15	
Industrial Engineering 300.....	2	
Electrical Technology 274	1	
	<hr/>	
	33	
Senior Year		
Arts (GER).....		3
Humanities (GER)		
English (Literature).....	3	
History	3	
Civil Engineering 357, 437, 438, 439	10	
Civil Technology 424, 475, 492	6	
Directed Electives*.....	6	
	<hr/>	
	31	

Total Semester Hours 125
 (GER): General Education Requirement (pg. 29)
 *Directed Electives chosen by student in consultation with faculty advisor, the Construction Engineering Technology Program Coordinator, and approved by the Civil Engineering Program Chair.

Computer Science

Computer Science is primarily concerned with the study of algorithms and the data structures on which they operate. Topics of interest include problem analysis; algorithm design, implementation, and testing; the definition of programming languages and the construction of environments for creating software; the study of computing hardware; the human/computer interface; and the development of formal techniques for characterizing algorithm efficiency.

The computer science curriculum at Louisiana Tech is designed to provide students with (1) a general education in mathematics, science, and the humanities; (2) an in-depth study of computing, including the practical and theoretical aspects of both hardware and software; (3) an opportunity for graduate study or a challenging position in industry. Because of the rapid pace of change in the field, the program places primary emphasis on fundamental computing concepts.

Computer Science Curriculum (B.S.C.S.)

Freshman Year	
Natural Sciences (GER)	
Biological Sciences 130, 131	4
English (GER).....	6
Humanities (GER)	
History	3

Mathematics (GER)		
Mathematics 240, 241, 242.....	9	
Computer Sciences 100, 120, 220.....	9	
	<hr/>	
	31	
Sophomore Year		
Arts (GER)		3
Social Sciences (GER)		
Economics 215.....	3	
Additional Social Science course	3	
Natural Sciences (GER)		
Physics 201, 202, 261, 262	8	
Mathematics 311	3	
Computer Science 230, 240, 251, 265, 269.....	12	
	<hr/>	
	32	

Junior Year	
Humanities (GER)	
English 303	3
English (Literature)	3
Speech 377.....	3
Computer Science 310, 325, 330, 345, 364.....	15
Directed Elective*	
Mathematics/Science.....	3
Minor/Support Area**.....	6
	<hr/>
	33

Senior Year		
Social Sciences (GER).....		3
Computer Science 404.....	3	
Statistics 405 or Industrial Engineering 400	3	
Directed Electives*		
Computer Science.....	9	
Minor/Support Area**.....	12	
	<hr/>	
	30	

Total Semester Hours126

(GER): General Education Requirement (pg. 29)
 *Directed Electives chosen by student in consultation with faculty advisor and approved by the Computer Science Program Chair.
 **All computer science majors are required to complete a minor in another discipline. The Computer Science Program Chair must approve the minor subject. After the requirements for a minor have been met, the balance of the minor/support area courses should be chosen from science, mathematics, engineering, computer science, or approved business courses.

Requirements for a Minor in Computer Science

Students in other departments who wish to minor in computer science are required to take 21 semester hours of computer science courses consisting of Computer Science 100, 120, 220, 325, and nine additional hours (six of which must be at the 300-level or above). All courses applied toward the minor must be completed with the grade of "C" or higher. Subject to the approval of the Computer Science Program Chair, students who complete a second bachelor's degree may use that degree to satisfy the minor requirement.

Electrical Engineering

Electrical Engineering is that profession which deals with the application of the fundamental laws of electrical phenomena to the service of mankind. Broadly, electrical engineers are involved in one or more of the following areas: electromagnetics; the design of electronic and solid-state devices; the control, conversion, and distribution of energy; computing and data processing; and communications including transmission and retrieval.

The Educational Objectives of this program follow:

- Depth. To produce graduates who have a fundamental knowledge needed for the practice, or advanced study in, electrical engineering. Our graduates will receive an emphasis in at least two of the following four application

areas: electric power, communications, controls, and microelectronics.

- Breadth. To produce graduates who have a broad education necessary for productive careers or the pursuit of graduate education, including a knowledge of important current issues in electrical engineering.
- Professionalism. To produce graduates who have strong communications skills, who understand and undertake professional ethical responsibilities, and who function effectively as members and leaders of multi-disciplinary teams.
- Lifelong Learning. To produce graduates who believe that their undergraduate electrical engineering education was a wise investment and who continue to develop their knowledge and skills after graduation.

The curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC-ABET). Graduation from an EAC-ABET accredited program is one of the requirements for qualifying as a Registered Professional Engineer in Louisiana as well as most other states. If, in addition to meeting the minimum requirements established for an EAC-ABET accredited curriculum, a graduate has maintained a relatively good scholastic record, the graduate may qualify for further study in the advanced degree program.

The College of Engineering and Science offers the opportunity for graduate study leading to the degree of Master of Science and the Doctor of Philosophy in Engineering. These programs seek to build on the basic foundations established by the undergraduate course of study. Each is in large measure an individual matter developed jointly by the student and an Advisory Committee. The plan of study may reflect a desire for more specialized undertakings or a continuing interest in the broad, underlying theories of the profession. In each case, the culmination of the program is the required graduated research project, with thesis or dissertation, accomplished with aid and guidance of a research advisor. An M.S. non-thesis option is available with additional course work. Those who attain an advanced degree will find a wide range of opportunities for rewarding careers in many areas of business, industry, government, and education.

Electrical Engineering Curriculum (B.S.E.E.)

Freshman Year	
English (GER).....	6
Mathematics (GER)	
Mathematics 240, 241, 242	9
Natural Sciences(GER)	
Biological Science 101	3
Physics 201	3
Chemistry 100, 101, 103.....	5
Engineering 120, 121, 122	6
	32
Sophomore Year	
Humanities (GER)	
History	3
Natural Sciences (GER)	
Physics 202	3
Social Sciences (GER)	3
Economics 215	3
Engineering 220, 221, 222	9
Mathematics 243, 244, 245	9
Electrical Engineering 232, 311.	4
	31
Junior Year	
Humanities (GER)	
English 201 or 202	3
Social Sciences (GER)	3

Industrial Engineering 300	2
Electrical Engineering 223, 242, 321, 334, 335, 381, 411	21
Mechanical Engineering 292.....	3
	32
Senior Year	
Arts (GER)	3
Humanities (GER)	
English 303, 463.....	6
Social Sciences (GER).....	3
Electrical Engineering 406, 407, 408, 422	7
Directed Electives*	6
Electrical Engineering Senior Option**	8
	33

Total Semester Hours128

(GER): General Education Requirement

*Directed Electives chosen by the student in consultation with faculty advisor from an approved list of courses offered in the College of Engineering & Science.

**Electrical Engineering Seniors are required to complete two groups of courses (total 8 hrs.) selected from the following three groups:

Electrical Engineering 461(3) & 469(1)

Electrical Engineering 471(3) & 479(1)

Electrical Engineering 481(3) & 489(1)

Electrical Engineering Technology

The increasing complexity of industrial processes and the expansion in research and production have created demand for a new group of specialists known as engineering technologists. These technologists work with professional engineers and scientists or assume independent responsibility in the production, installation, operation, and maintenance of complex technical apparatus. The engineering technologist organized the personnel, materials and equipment to design, construct, operate, and manage technical projects. The engineering technologist coordinates people, materials, and machines and must possess a variety of skills and practical and theoretical knowledge.

Electrical Engineering Technology includes the areas of computers, electrical power, communications, instrumentation, and control systems. The program combines course work and coordinated laboratory work so that graduates will be capable of performing a variety of technical tasks demanded of them. The course and laboratory work emphasize the latest in solid-state and integrated circuit and microprocessor technology. The graduate will also have received training in technical writing, public speaking, documentation, and general industrial practices which result in rapid advancement in a typical industrial organization. Thus, the program produces graduates qualified for a wide variety of commercial and industrial employment in the rapidly developing electrical-electronics technology field.

The program is accredited by the Technology Accreditation Commission Board for Engineering and Technology (TAC-ABET).

Electrical Engineering Technology Curriculum (B.S.E.T.)

Freshman Year	
Arts (GER)	3
Computer Literacy (GER)	
Computer Science 100	3
English (GER).....	6
Humanities (GER)	
History	3
Mathematics (GER)	
Mathematics 111, 112	6
Electrical Engineering Technology 100, 170,171,180,181	9
	30
Sophomore Year	
Natural Sciences (GER)	

Physics 209, 210, 261, 262.....	8
Mathematics 220, 223	6
Electrical Engineering Technology 260, 261, 270, 271, 272, 273, 280, 284	19
	<hr/>
	33
Junior Year	
Humanities (GER)	
English (Literature).....	3
English 303.....	3
Social Sciences (GER).....	3
Chemistry 100, 101, 103	5
Engineering Mechanics 206.....	3
Electrical Engineering Technology 360, 361, 370, 371, 390.....	11
Mechanical Technology 215.....	3
	<hr/>
	31
Senior Year	
Natural Sciences (GER)	
Biological Sciences.....	3
Humanities (GER)	
Speech 377.....	3
Social Sciences (GER).....	6
Electrical Engineering Technology 460, 461, 465, 470, 471, 472	11
Directed Electives*	
Electrical Engineering Technology.....	4
Additional Course.....	3
	<hr/>
	30
Total Semester Hours	124
(GER): General Education Requirements (pg. 28)	
*Directed Electives chosen by student in consultation with faculty advisor and approved by the Electrical Engineering Program Chair.	

Geosciences

Geology is a diverse field that encompasses many areas of specialization such as environmental geology, geochemistry, geophysics, hydrogeology, mineralogy, oceanography, paleontology, petrology, petroleum geology, sedimentology, stratigraphy, and structural geology. These fields touch every facet of modern civilization and economic development from the discovery and development of mineral resources to the identification and remediation of environmental problems to the more exotic exploration of the moon and planets. There are numerous employment opportunities available for geologists with petroleum, mining, and environmental industries, U.S. Army Corps of Engineers, U.S. Navy, National Park Service, NASA, and other branches of local, state, and federal government.

The geosciences curriculum, leading to the Bachelor of Science degree in geology, is designed to give students a broad and fundamental education in geology with a background in mathematics, physics, chemistry, and technical writing. There is enough flexibility to allow students to earn a minor in diverse areas such as technical writing, chemistry, and business. The curriculum is designed for those students planning for a professional career in geology, the earth sciences, or an advanced degree.

Geology Curriculum (B.S.G.)

Freshman Year	
Natural Sciences (GER)	
Chemistry 100, 101, 102, 103, 104.....	8
English (GER).....	6
Humanities (GER)	
English 201 or 202.....	3
Geology 111*, 112*, 121*, 122*	8
Mathematics (GER)	
Mathematics 240*, 241*.....	6
	<hr/>
	31
Sophomore Year	
Natural Sciences (GER)	
Biological Sciences 130.....	3
Social Sciences (GER)	

Economics 215.....	3	
Geology 209, 211, 318.....	9	
Humanities (GER)		
History.....	3	
Mathematics 242*, 243.....	6	
Physics 209, 210, 261, 262.....	8	
	<hr/>	
	32	
Junior Year		
Arts (GER).....		3
Humanities (GER)		
English 303.....	3	
Geology 302, 303, 305, 315, 316.....	14	
Geology 320 (Summer Field Camp).....	6	
Agricultural Sciences 320.....	3	
Social Sciences (GER).....	3	
	<hr/>	
	32	
Senior Year		
Geology 422, 460.....	6	
Humanities (GER)		
Speech 377 or English 463	3	
Social Sciences (GER).....	3	
Directed Electives**	17	
	<hr/>	
	29	

Total Semester Hours124
(GER): General Education Requirement (pg. 29)

*Must achieve a C or better in each of these courses to advance.

**Directed Electives chosen by student in consultation with faculty advisor.

Requirements for a Minor in Geology

A minor in geology consists of Geology 111, 112, 121, 122, and 13 additional hours, at least 9 of which must be at the 300 or 400 level. All courses applied toward the minor must be completed with the grade of "C" or higher.

Industrial Engineering

Industrial engineering involves decision-making related to the best use of people, material, equipment and energy to achieve the goals of an organization. The organization may be a manufacturing facility, hospital, bank, amusement park, airline, government office, or any other group organized to make a product or perform a service. Industrial Engineers (IEs) make significant contributions to their employers by saving money while making the workplace better for fellow workers.

If there is one phrase that summarizes the activities of IEs, it is "the search for a better way." For example, a better way to make workplaces more comfortable and safer by improving workstations and work procedures, a better way to perform assembly operations using robots and machine vision systems, a better way to reduce inventory cost using Just-In-Time (JIT) technology, a better way to assure product quality by statistical process control (SPC) techniques, a better way to improve the efficiency of the entire organization by a computerized enterprise resource planing (ERP) system, and so on.

Manufacturing firms and service industries hire a significant number of IEs. Today, more and more businesses hire IEs in areas like computer information systems, business operations, finance, and sales & marketing. Corporations as diverse as Coca Cola, UPS, Disney, IBM, Entergy, Nike, The Gap, Intel, Microsoft, Motorola, Boeing all use people with IE backgrounds to help manage their business. Many IEs enter the workforce as engineers but eventually move up to the upper level of management.

The industrial curriculum has been developed to prepare students for meaningful careers in this challenging and important branch of engineering. The success of the program is evidenced by the high demand for its graduates in all sectors of

the economy and the many professional accomplishments of the faculty.

The Educational Objectives of the Industrial Engineering Program follow:

- To produce graduates that can use the techniques, skills, and modern engineering tools for successful industrial engineering careers that support local/regional/national economy
- To produce graduates who can design and integrate systems with machines, people, materials, and information for productivity, quality and work environment improvements
- To produce graduates with effective written and oral communication skills
- To produce graduates who can work collaboratively in teams and understand their professional and ethical responsibilities
- To produce graduates capable to continue into graduate program and/or life-long learning

The program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC-ABET). Graduates of this program are qualified to pursue registration as a Professional Engineer in Louisiana as well as most other states.

Industrial Engineering Curriculum (B.S.I.E.)

Freshman Year	
Natural Sciences (GER)	
Chemistry 100*, 101*, 103*, 104	6
English (GER)	6
Mathematics (GER)	
Mathematics 240*, 241*, 242*	9
Engineering 120*, 121*, 122*	6
Physics 201*	3
Industrial Engineering 101	3
	33
Sophomore Year	
Natural Sciences (GER)	
Biological Sciences 101	3
Engineering 220, 221, 222	9
Industrial Engineering 300, 301	4
Mechanical Engineering 215, 321, 351	5
Mechanic & Materials 201	2
Mathematics 243*, 244*, 245	9
	32
Junior Year	
Humanities (GER)	
English 303, 463	6
History	3
Social Sciences (GER)	
Economics 215	3
Industrial Engineering 400, 401, 402, 404, 405, 407, 409	21
	33
Senior Year	
Arts (GER)	3
Social Sciences (GER)	6
Humanities (GER)	
English (Literature)	3
Industrial Engineering 408, 410, 411, 412	10
Directed Electives**	9
	31
Total Semester Hours	124
(GER): General Education Requirement (pg. 29)	
*Grade of "C" or higher required.	
**Directed Electives, chosen by student in consultation with faculty advisor and approved by the Industrial Engineering Program Chair.	

Students receiving a grade of "D" or "F" in any mathematics course that is a prerequisite of another required course in the curriculum, must repeat and pass the failed course prior to proceed in the curriculum. The maximum number of industrial engineering courses that are allowed to receive a grade of "D" is two. Students receiving more than two Ds in industrial engineering courses must repeat and pass one or more failed courses until this requirement is met.

Mathematics and Statistics

Mathematics and statistics courses are designed as follows: (1) to provide mathematics courses in the core curriculum; (2) to serve the requirements of students pursuing a curriculum in business, education, engineering, etc.; and (3) to provide students majoring in mathematics a thorough preparation for graduate mathematics or employment in industry or education. This program leads to the Degree of Bachelor of Science.

Placement in Mathematics and Statistics

Placement in entry-level college mathematics and statistics courses is based on the Enhanced ACT/SAT Math score. If no scores are on file in the Office of Admissions or the Office of the University Registrar, the score will be assumed to be 0.

The ACT/SAT Math score is used as a measure of preparation for entry-level college mathematics and statistics courses. Placement Evaluations are offered if a student desires to bypass the course required by ACT/SAT Math placement. The placement procedure stated below ensures that each student begins the study of mathematics and statistics at a level for which he or she is prepared.

ACT/SAT MATH Score	Course Placement
0-15 ACT MATH 0-370 SAT MATH	Placement in MATH 099. Not eligible for Math Placement Exam.
16-17 ACT MATH 380-420 SAT MATH	Placement in MATH 099 or take and pass Placement Exam A** to place in MATH 100*
18-21 ACT MATH 430-510 SAT MATH	Placement in MATH 100*. No Placement Exam is available for bypassing MATH 100.
22-23 ACT MATH 520-550 SAT MATH	Placement in MATH 101. Not eligible for Math Placement Exam.
24-25 ACT MATH 560-580 SAT MATH	Placement in MATH 101 or take and pass Placement Exam B to earn credit for MATH 101. Advance preparation for the exam is necessary**.
26 or higher ACT MATH 590 or higher SAT MATH	Credit for MATH 101 will be granted if MATH ACT/SAT score was earned within the previous five years. Eligible to enroll in MATH 101 or Math or Statistics course that has MATH 101 as the only Math prerequisite. If such a student desires to begin with MATH 220 or 222 as the first math course, Placement Exam C is required to earn credit for MATH 111 and 112. Advance preparation for the exam is necessary**.

NOTE: Permission to take a placement/credit exam in a given course will be denied those students who have previously attempted the course and/or the placement/credit exam. Refer to the "Louisiana Tech Credit Examinations" sections of this Bulletin for additional information.

* MATH 100 serves as a replacement for MATH 101 for students required to enroll in MATH 100.

** Various review materials for the Math Placement Exams are available free of charge by accessing the web site rehanna.pageout.net. Select the desired course, then "Syllabus", then select "Instructions for Accessing Review Materials". Print the instruction sheet and follow the stated instructions.

Transfer students who do not have credit for the equivalent of the mathematics prerequisite for a course must satisfy the same placement criteria as entering freshman. This may require submission of ACT/SAT score reports that would not be needed for transfer admission to the University. Transfer credit for

prerequisite mathematics courses must be evaluated and approved through the mathematics program before registration in a mathematics or statistics course.

The degree of success in the mathematics or statistics course of placement is ultimately determined by both your mathematics preparation for the course and your meeting the performance expectations for the course. The curriculum requirements for your major will determine which mathematics and statistics courses you are required to complete.

In addition to the ACT/SAT and Placement Evaluation requirements for placement in entry-level college mathematics and statistics courses, it is assumed that college preparatory courses, as indicated below for each level, have been completed with a grade of C or higher on the content normally covered in such courses. Also note that an ACT Math score of at least 22 or an SAT Math score of at least 520 is required in order to begin entry-level mathematics or statistics courses without having deficiency work to complete. An ACT Math score of at least 26 or an SAT Math score of at least 590 is required for courses with Math 101 as prerequisite.

Mathematics Course Level	ACT/SAT and College-Prep Course Prerequisite Requirement
MATH 099: Preparation for College Math	College Prep: Algebra I
MATH 100B-C: College Algebra (5-Hour Format)	MATH ACT: 18-21 MATH SAT: 430-510 College Prep: Algebra I, Algebra II
MATH 101: College Algebra (3-hr. format)	MATH ACT: 22 or higher MATH SAT: 520 or higher College Prep: Algebra I, Algebra II
Courses with MATH 101 as Prerequisite	MATH ACT: 26 or higher MATH SAT: 590 or higher College Prep: Algebra I, Algebra II, Geometry, One other College Prep Math
MATH 220, or 222, or 240	College Prep: Algebra I, Algebra II, Geometry, Trigonometry, Advanced Algebra

Mathematics Credit by Placement Exam

Credit for MATH 101 will be granted for each student with MATH ACT score greater than or equal to 26 or MATH SAT score greater than or equal to 590 of the MATH ACT/SAT score was earned within the previous five years.

Credit for MATH 101, MATH 111, or MATH 112 will be granted to each student who is eligible for and successfully completes the Placement Exam for the course. See the Placement in Math and Statistics section of this Bulletin for eligibility requirements for each exam.

Requirements for a Major in Mathematics

Each student majoring in mathematics is assigned an advisor from the Mathematics and Statistics program. The student is requested to meet with his/her advisor at least once during each quarter, at which time courses for the following quarter are decided upon.

Each mathematics major must complete the mathematics curriculum which follows with a grade of 'C' or higher in all mathematics and statistics courses, and must complete a minor. The minor subject must be chosen with the approval of the student's advisor. The minor requirements are listed under the department concerned.

Students who wish to obtain a more intensive degree program with a concentration in statistics-mathematics -engineering are not required to declare a minor if they earn credit for the following courses: (1) fifteen semester hours of 400-level mathematics and statistics courses (with a minimum of 9 semester hours of mathematics courses) which are approved by the student's advisor; and (2) six semester hours of engineering courses which are approved by the student's advisor. Note: No course may count

toward the required mathematics and statistics courses in the mathematics curriculum and also the statistics-mathematics-engineering concentration.

Mathematics Curriculum (B.S.)

Freshman Year	
Natural Sciences (GER)	
Chemistry 100, 101, 102, 103, 104	8
English (GER)	6
Mathematics 240, 241, 242	9
Humanities (GER)	
History 101, 102, 201, or 202	6
	29
Sophomore Year	
Computer Literacy (GER)	
Computer Science 120	3
Social Sciences (GER)	6
Mathematics 243, 244, 245	9
Physics 201, 202, 261, 262	8
Humanities (GER)	
English 201 or 202	3
Electives for Minor/Concentration	3
	32
Junior Year	
Arts (GER)	3
Foreign Language	6
Mathematics 307, 308	6
Mathematics or Statistics Elective*	6
Natural Sciences (GER)	
Biological Sciences	3
Electives for Minor/Concentration	9
	33
Senior Year	
Humanities (GER)	
English 303	3
Speech 110	3
Mathematics 318, 340	6
Mathematics or Statistics Elective*	6
Electives for Minor/Concentration	6
Science Elective	3
Social Sciences (GER)	3
	30
Total Semester Hours	124

(GER): General Education Requirement (pg. 29)

*Mathematics electives above 300, Statistics electives above 200 (other than STAT 402).

Requirements for a Minor in Mathematics

Students in other departments who wish to minor in mathematics are required to take Math 240, 241, 242, 243, 244, 245 and an additional 9 semester hours earned in statistics courses or mathematics courses numerically above Math 300 and Statistics 200 (other than STAT 402). No more than 6 semester hours may be in statistics. All courses applied toward the minor must be completed with the grade of "C" or higher.

Mechanical Engineering

Mechanical Engineering is the profession that deals with the design, development, testing, manufacturing, and maintenance of machines, systems, devices, and components for the betterment of society. Mechanical engineers are involved with such areas as aerospace engineering, automatic control systems, automotive engineering, chemicals, oil and gas, computer aided design, manufacturing, energy conversion, engineering materials, environmental engineering, machine design, manufacturing processes, medicine, robotics, stress analysis, and thermal systems.

Mechanical engineers may deal with hardware as small as a microchip or as large as an aircraft carrier. They may work from

the bottom of the ocean up to the weightless environment of interplanetary space. Of all the engineering disciplines, mechanical engineering is the most diversified and offers the largest selection of career paths. If you can see it or touch it, a mechanical engineer probably helped to create it.

The mechanical engineering curriculum at Louisiana Tech is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. The curriculum is designed to prepare students for the practice of mechanical engineering through the achievement of the following educational objectives:

- To prepare students for lifelong learning and successful mechanical engineering careers
- To train students thoroughly in methods of analysis, including the mathematical and computational skills appropriate for mechanical engineers to use when solving problems
- To develop the skills pertinent to the engineering design process, including the students' abilities to formulate problems, to think creatively, to synthesize information, and to work collaboratively in teams
- To teach students to use current experimental and data analysis techniques for mechanical engineering applications
- To develop oral and written communication skills that allow students to present information effectively
- To instill in our students an understanding of their professional and ethical responsibilities

The curriculum includes courses featuring a wide variety of both technical and non-technical topics. Instruction is delivered in a variety of modes designed to assure that upon graduation, each student has the ability to become a successful Mechanical Engineer.

Mechanical Engineering Curriculum (B.S.M.E.)

Freshman Year	
Natural Sciences (GER)	
Chemistry 100*, 101*, 103*	5
Physics 201*	3
Biological Sciences 101	3
English (GER)	6
Mathematics (GER)	
Mathematics 240*, 241*, 242*	9
Engineering 120*, 121*, 122*	6
	32
Sophomore Year	
Natural Sciences (GER)	
Chemistry or Physics	3
Social Sciences (GER)	3
Humanities (GER)	
English 303	3
Engineering 220*, 221*, 222*	9
Mechanical Engineering 215, 292	4
Mechanics & Materials 201*, 312*	4
Mathematics 243*, 244*, 245*	9
	35
Junior Year	
Humanities (GER)	
History	3
Industrial Engineering 300	2
Mechanical Engineering 321, 334, 351	
353, 361, 363, 371, 382	20
Mechanics & Materials 211, 313	5
	30
Senior Year	
Arts (GER)	3
Social Sciences (GER)	6

Humanities (GER)	
English (Literature)	3
English 463	3
Mechanical Engineering 400, 451, 465, 486, 492, 494	10
Directed Electives**	6
	31

Total Semester Hours	128
(GER): General Education Requirement (pg. 29)	
*Grade of "C" or higher required.	
**Directed Electives, chosen by student in consultation with faculty advisor and approved by the Mechanical Engineering Program Chair.	

Physics

This curriculum is designed to give a broad and fundamental knowledge of the principles of physics as well as an introduction to the techniques of physics research. Although the primary aim of the basic curriculum is to prepare the student for graduate work in physics, sufficient specialized courses are available to prepare the graduate for jobs in industry and in various government laboratories. A physics major is an excellent choice for the pre-medical student.

Requirements For a Major in Physics

Each student majoring in physics is required to follow the physics curriculum leading to the Bachelor of Science degree in physics.

For students interested in interdisciplinary fields involving physics, it is suggested that the physics curriculum be followed with all electives taken in the other field of interest. Some interdisciplinary fields are listed with the appropriate elective field in parentheses: astrophysics (astronomy), geophysics (geology), materials science (chemistry and engineering), biophysics (microbiology), mathematical physics (mathematics), solid state (chemistry and engineering).

Physics Curriculum (B.S.)

Freshman Year	
Natural Sciences (GER)	
English (GER)	6
Humanities (GER)	3
Social Sciences (GER)	3
Mathematics (GER)	
240, 241, 242	9
Physics 102, 103	2
	29
Sophomore Year	
Arts (GER)	3
Humanities (GER)	6
Mathematics 243, 244, 245	9
Physics 201, 202, 261, 262, 304	8
Directed Electives*	6
	32
Junior Year	
Natural Sciences (GER)	3
Humanities (GER)	3
Mathematics Elective	3
Physics 307, 416, 417, 418, 419, 422	14
Directed Electives*	9
	32
Senior Year	
Social Sciences (GER)	6
Physics 406, 407, 408, 409, 423, 424	13
Directed Electives*	9
	28
Total Semester Hours	121

(GER): General Education Requirement (pg. 29)

*Directed electives can be chosen from advanced Physics, Mathematics, Engineering, Computer Science, or Chemistry courses and must include at least one computer programming course such as Engineering 102 (C++) or Computer Science 120.

Requirements for a Minor in Physics

Students from other departments who elect a minor in physics should complete Physics 201, 202, 261, 262 and 14 semester hours of advanced courses 300-400 level. All courses applied toward the minor must be completed with the grade of "C" or higher.

Laser/Optics Concentration

A laser/optics concentration is designed to provide students with more specific studies in the area of lasers and optics. Technical electives in the third and fourth years of study are to be taken from courses such as physical optics, geometrical optics, lasers, modern optics, and Fourier optics. Laboratory courses emphasize hands-on learning through experimentation with modern optical equipment.