

# College of Engineering and Science

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## 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 reopened and began enrolling students.

## 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 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 Program**

The Undergraduate Research Opportunities Program (UROP) provides academically qualified undergraduate students an opportunity to gain experience on campus by working part-time as a member of a research team including faculty and graduate students. The UROP program provides compensation that 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 in the UROP program 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 2.5 or better.

The selection of students for the UROP program will be made 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 2.5. 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, Associations 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 departments. Scholarships derived from annual gifts are subject to cancellation or modification by the sponsoring agency.

#### **Aillet, Fenner, Jolly, and McClelland Scholarship**

Two \$1,000 scholarships are given each year to students in civil engineering. Students are selected based on academic ability, extracurricular activities, leadership potential, and financial need.

#### **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 Freshmen Academic Scholarships**

Scholarships of \$600 are awarded to incoming chemical engineering freshmen for the first academic year. These awards are based on ACT scores, placement exams, and high school records. The student must establish and maintain a 3.0 grade point average and remain a full-time student in chemical engineering. Students may be continued on chemical engineering scholarships after the freshman year.

#### **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.

#### **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.

**Instrument Society of America Scholarship**

The Monroe Chapter of ISA provides scholarships for juniors and seniors pursuing a degree in an engineering program.

**T. L. James and Company Scholarships**

A \$1,250 scholarship is awarded each Fall to a particularly well-rounded civil engineering or construction engineering technology freshman. The award is continued each year if the student remains in good academic standing and remains in one of the specific disciplines of study.

**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.

**Louisiana Hydroelectric Engineering Scholarship**

A \$2500 scholarship is awarded each year to a student from Concordia Parish pursuing a degree in the College of Engineering and Science. Recipient must maintain a 2.5 or better grade point average.

**McDermott Incorporated Scholarships**

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

**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.

**J. L. Orr Scholarship**

Investment proceeds from funds given by Edward and Virgil Orr in memory of their father are used to support superior students at the graduate or undergraduate levels in chemical engineering. Awards are based on merit and need.

**Pipes Foundation Scholarship**

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

**Richwood-Manville Scholarships in Chemical Engineering**

This scholarship is awarded to juniors or seniors in chemical engineering. Requirements are superior academic record and interest in the pulp and paper industry, \$1000 award and consideration for summer employment between junior and senior year.

**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.

**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.

**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.

**Square D Company Scholarship**

Three \$500 scholarships are awarded annually to deserving students majoring in electrical engineering technology.

**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.

**Clotilde and Hall Terry Scholarships**

Two scholarships are awarded to freshmen majoring in computer science. Recipients are chosen by the computer science faculty. The awards may be continued up to four years at the discretion of the computer science faculty.

**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.

#### **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.

#### **Bruce Tucker Memorial Scholarship**

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

#### **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. Whittlesey 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.

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>Freshman Year</b>	
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
	32
<b>Sophomore Year</b>	
Natural Sciences (GER)	
Biological Sciences 225, 227 .....	6
Arts (GER) .....	3
Biomedical Engineering 202, 203, 204 .....	3
Engineering 220, 221, 222 .....	9
Mathematics 243, 244, 245 .....	9
Physics 202 .....	3
	33
<b>Junior Year</b>	
Humanities (GER)	
English 201 or 202, and 303 .....	6
Biomedical Engineering 301, 303, 325, 420 .....	13
Biological Sciences 321 .....	1
Electrical Engineering 223 .....	3
Directed Electives* .....	7
	30
<b>Senior Year</b>	
Social Sciences (GER)	
Economics 215 .....	3
Additional Social Sciences Courses .....	6
Humanities (GER)	
History .....	3
Speech 377 .....	3
Biomedical Engineering 400, 401, 402, 404, 425 .....	11
Directed Electives* .....	6
	32
<b>Total Semester Hours</b> .....	128

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

The Biomedical Engineering Program normally requires a "C" or better in any course which serves as a prerequisite for another course.

\*Directed Electives chosen by student in consultation with faculty advisor from one of the following four concentrations:

**PreMedical:** Biological Sciences (3 or 4 hr.); Chemistry 250, 251, 252, 253, 254; Physics 261, 262.

**Chemical Engineering:** Chemical Engineering 213, 313, 353, 413, and one additional 3 hr. Chemical Engineering course at 300- or 400-level.

**Electrical Engineering:** Electrical Engineering 232, 311, 335, 1 hr. Electrical Engineering lab course, and one additional 3 hr. Electrical Engineering 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.

### 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.

### Chemical Engineering Curriculum (B.S.)

<b>Freshman Year</b>	
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
	32
<b>Sophomore Year</b>	
Engineering 220, 221, 222 .....	9
Chemical Engineering 202, 213, 254 .....	7
Chemistry 250, 251, 252, 253 .....	7
Mathematics 243, 244, 245 .....	9
	32
<b>Junior Year</b>	
Humanities (GER)	
Speech 377 or English 463 .....	3
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
	<hr/>
	32
Senior Year	
Arts (GER) .....	3
Natural Sciences (GER)	
Biological Sciences 101 .....	3
Social Sciences (GER) .....	6
Chemical Engineering 402, 407, 430, 432, 434, 451 .....	14
Directed Elective* .....	6
	<hr/>
	32
Total Semester Hours .....	128

(GER): General Education Requirement (pg. 29).  
\*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. Three of the six hours must be selected from non-required senior level courses in the Chemical Engineering Program. 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 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 can make the following substitutions: Physics 209, 210 for Physics 201, 202; Humanities elective for English 303; Chemistry 351, 352, 353, 354 for Chemistry 466, 481; Biological Sciences 121, 124, 125 for Mathematics 233, 350; Biological Sciences 310, 315 for Directed Electives; Biological Sciences 290 and two semesters of electives for Chemistry 409 or 420 or 424 or 498 (any two).

### Chemistry Curriculum (B.S.)

Freshman Year	
Natural Sciences (GER)	
Chemistry 100, 101, 102, 103, 104 .....	8
Biological Sciences 120 .....	3
English (GER) .....	6
Mathematics (GER)	
Mathematics 111, 112, 230 .....	9
Social Sciences (GER) .....	6
	<hr/>
	32
Sophomore Year	
Chemistry 205, 250, 251, 252, 253, 254 .....	12
Mathematics 231, 232 .....	6
Physics 201, 202, 261, 262 .....	8
Arts (GER) .....	3
	<hr/>
	29
Junior Year	
Chemistry 281, 311, 312, 313, 314 .....	11
Humanities (GER)	
English 201 or 202, and 303 .....	6
Mathematics 233, 350 .....	6
Directed Electives* .....	6
	<hr/>
	29

Senior Year	
Chemistry 466, 481 .....	7
Chemistry 409 or 420 or 424 or 498** (any two) .....	6
Humanities (GER)	
History .....	3
Speech 377 .....	3
Social Sciences (GER) .....	3
Electives .....	8
	<hr/>
	30
Total Semester Hours .....	120

(GER): General Education Requirements (pg. 29).  
\*Directed Electives chosen by student in consultation with faculty advisor. Mathematics 308 and 313 are 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 which 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.

### 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.

## 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: computer-aided design, 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 Curriculum (B.S.)

Freshman Year	
Natural Sciences (GER)	
Chemistry 100, 101, 103 .....	5
Physics 201 .....	3
English (GER) .....	6
Humanities (GER)	
History .....	3
Mathematics (GER)	

Mathematics 240, 241, 242 .....	9
Engineering 120, 121, 122 .....	6
	32
<b>Sophomore Year</b>	
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
<b>Junior Year</b>	
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
<b>Senior Year</b>	
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
<b>Total Semester Hours</b> .....	128

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

\*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.

This 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.

## Construction Engineering Technology Curriculum (B.S.)

<b>Freshman Year</b>	
Natural Sciences (GER)	
Biological Sciences 101 .....	3
Physics 209, 261 .....	4
English (GER) .....	6
Mathematics (GER)	
Mathematics 111, 112 .....	6
Business Law 255 .....	3
Civil Engineering 254 .....	3
Civil Technology 100 .....	3
	28
<b>Sophomore Year</b>	
Humanities (GER)	
English 303 .....	3
Natural Sciences (GER)	
Physics 210, 262 .....	4
Social Sciences (GER)	
Economics 215 .....	3
Social Sciences courses .....	6
Computer Literacy (GER) .....	3
Engineering 151 .....	2
Mathematics 220 .....	3
Mechanics & Materials 206 .....	3
Statistics 200 .....	3
Accounting 201 .....	3
	33
<b>Junior Year</b>	
Humanities (GER)	
Speech .....	3
Management 201 plus an additional Management course .....	6
Chemistry 120 .....	3
Civil Technology 210, 372, 373, 471, 473 .....	15
Industrial Engineering 300 .....	2
Directed Elective* .....	3
	32
<b>Senior Year</b>	
Arts (GER) .....	3
Humanities (GER)	
English (Literature) .....	3
History .....	3
Civil Engineering 357, 436, 437, 438, 439 .....	13
Civil Technology 424, 475 .....	4
Directed Electives* .....	6
	32
<b>Total Semester Hours</b> .....	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.)

Freshman Year	
Natural Sciences (GER)	
Biological Sciences 120, 121 .....	4
English (GER) .....	6
Humanities (GER)	
History .....	3
Mathematics (GER)	
Mathematics 230, 231, 232 .....	9
Computer Sciences 100, 120, 220 .....	9
	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
	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
	33
Senior Year	
Social Sciences (GER) .....	3
Computer Science 404 .....	2
Statistics 405 or Industrial Engineering 400 .....	3
Directed Electives*	
Computer Science .....	9
Minor/Support Area** .....	12
	29
Total Semester Hours .....	125

(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).

### 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 undergraduate electrical engineering curriculum is a carefully planned program of study designed to meet the challenges of expanding professional opportunities. From foundations in the basic sciences of mathematics, physics and chemistry, the program progresses through the engineering sciences to emphasize the roles of mechanics, thermodynamics, and electrical theory in the analysis, synthesis, design, and operation of engineering devices and systems. A coordinated laboratory program utilizing modern equipment and facilities seeks to supplement classroom instruction, stimulate creativity, and further professional competence. Finally, a variety of courses selected to provide an adequate humanistic and cultural background is included to ensure both the recognition and fulfillment of the engineer's responsibilities as a citizen.

The curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC-ABET for Electrical Engineering, TAC-ABET for Electrical Engineering Technology). 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 graduate research project, with thesis or dissertation, accomplished with the 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.)

Freshman Year	
English (GER) .....	6
Mathematics (GER)	
Mathematics 240, 241, 242 .....	9
Natural Sciences (GER)	
Physics 201 .....	3
Chemistry 100, 101, 103 .....	5
Engineering 120, 121, 122 .....	6
Electrical Engineering 232 .....	2
	31

Sophomore Year

Humanities (GER)

    History .....

    Natural Sciences (GER)

Physics 202 .....	3
Social Sciences (GER) .....	3
Engineering 220, 221, 222 .....	9
Mathematics 243, 244, 245 .....	9
Mechanics & Materials 201 .....	2
Electrical Engineering 223 .....	3
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	32

Junior Year	
Natural Sciences (GER)	
Biological Sciences 101 .....	3
Social Sciences (GER)	
Economics 215 .....	3
Humanities (GER)	
English 201 or 202 .....	3
Electrical Engineering 242, 311, 321	
334, 335, 381, 422 .....	21
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	30

Senior Year	
Arts (GER) .....	3
Humanities (GER)	
English 303, 463 .....	6
Social Sciences (GER) .....	3
Electrical Engineering 406, 407, 408, 411 .....	9
Directed Electives* .....	6
Electrical Engineering Senior Option** .....	8
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	35

Total Semester Hours ..... 128

(GER): General Education Requirement (pg. 29).  
Competence must be demonstrated in a higher level computer language such as "C" or FORTRAN before the Junior year.

\*Directed Electives chosen by 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 the 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 organizes 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 emphasizes 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 of the Accreditation Board for Engineering and Technology.

### Electrical Engineering Technology Curriculum (B.S.)

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
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	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, 285 .....	19
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	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
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	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
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	30

Total Semester Hours ..... 124

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

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.

### Geology Curriculum (B.S.)

Freshman Year	
Natural Sciences (GER)	
Chemistry 100, 101, 102, 103, 104 .....	8
Biological Sciences 120 .....	3
English (GER) .....	6
Humanities (GER)	
English 201 or 202 .....	3
Geology 111, 112, 121, 122* .....	8
Mathematics (GER)	
Mathematics 111, 112 .....	6
	31
Sophomore Year	
Natural Sciences (GER)	
Biological Sciences 120 .....	3
Social Sciences (GER)	
Economics 215 .....	3
Geology 209, 211, 318 .....	9
Humanities (GER)	
History .....	3
Mathematics 230, 231 .....	6
Physics 209, 210, 261, 262 .....	8
	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
	32
Senior Year	
Geology 422, 460 .....	6
Humanities (GER)	
Speech 377 or English 463 .....	3
Social Sciences (GER) .....	3
Directed Electives** .....	17
	29
Total Semester Hours .....	124

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

\*Must achieve a C or better in each of the se courses to advance.

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

### 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, government office, individual department or any other group organized to make a product or perform a service. Usually, the aims of the organization include reducing costs. Hence, the industrial engineer is often very concerned with cost analysis and control.

If there is one phrase that summarizes the activities of industrial engineers, it is "the search for a better way." For example, a better way to perform assembly operations using robots and automated assembly systems, a better way to recover the cost of scrap from manufacturing processes using CAD/CAM systems, a better way to assure product quality and reliability via automated inspection and machine vision, and so on.

For several years, national leaders have been calling for increased productivity by the American people. A special activity of industrial engineers is to find ways to increase productivity without increasing the effort required by the individual worker.

The industrial engineering 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 demand for its graduates in all sectors of the economy and the many professional accomplishments of the faculty. The program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

### Industrial Engineering Curriculum (B.S.)

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
Social Sciences (GER)	
Economics 215 .....	3
Engineering 220, 221, 222 .....	9
Industrial Engineering 300, 301 .....	4
Mechanical Engineering 215, 321 .....	3
Mechanic & Materials 201 .....	2
Mathematics 243, 244, 245 .....	9
	33
Junior Year	
Humanities (GER)	
English 303, 463 .....	6
History .....	3
Industrial Engineering 400, 401, 402, 404, 405, 407, 409 .....	21
	30
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 ..... 127

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

\*Directed Electives, chosen by student in consultation with faculty advisor and approved by the Industrial Engineering Program Chair, must include two courses from Industrial Engineering 406, 413, 450, or 490; and three hours of design credit.

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 proceeding in the curriculum. The maximum number of industrial engineering courses that are allowed to receive a grade of "D" is two.

**Technical Enrichment Program:** Completion of four or more Mechanical Engineering/Industrial Engineering 499 courses will satisfy the enrichment program requirements; an indication of series completion will be made on the transcript. Contact the program for more information on the Technical Enrichment Series.

### 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 Registrar, the score will be assumed to be 0.

The ACT/SAT Math score is not used as an entrance examination. It 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.

22-25 ACT MATH 520-580 SAT MATH	May enroll in Math 101 or take and pass Placement Evaluation B to enroll in any mathematics or statistics course which has Math 101 as the only mathematics prerequisite.**
26 OR HIGHER ACT MATH 590 OR HIGHER SAT MATH	May enroll in Math101 or any mathematics or statistics course which has Math 101 as the only mathematics prerequisite. If such a student desires to begin with a calculus course (Math 220, Math 222, or Math 230) as the first math course, Placement Evaluation C is required. **
	* Math 100 serves as replacement for Math 101 for students required to enroll in Math 100 or both Math 099 and Math 100.  **No credit is given for courses bypassed except as stated in the Credit By Examination Section of this Bulletin.

**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 which 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.

ACT/SAT MATH SCORE	COURSE PLACEMENT
0-17 ACT MATH 0-420 SAT MATH	Must enroll in Math 099 or take and pass Placement Evaluation A to enroll in Math 100*
18-21 ACT MATH 430-510 SAT MATH, or successful completion of Math 099	May enroll in Math 100* or take and pass Placement Evaluation B to enroll in any mathematics or statistics course which has Math 101 as the only mathematics prerequisite.***

MATHEMATICS COURSE LEVEL	ACT/SAT AND COLLEGE PREP COURSE PREREQUISITE REQUIREMENT
MATH 099: PREPARATION FOR COLLEGE MATHEMATICS	COLLEGE PREP COURSE: ALGEBRA I
MATH 100: COLLEGE ALGEBRA (5-HOUR FORMAT)	MATH ACT: 18-21 MATH SAT: 430-510 COLLEGE PREP: ALGEBRA I, ALGEBRA II
MATH 101: COLLEGE ALGEBRA (3-HOUR FORMAT)	MATH ACT: 22 OR HIGHER (3-HOUR FORMAT) 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 1, ALGEBRA 11, GEOMETRY, ONE OTHER COLLEGE PREP MATH
CALCULUS	COLLEGE PREP: ALGEBRA I, ALGEBRA II, GEOMETRY, TRIGONOMETRY, ADVANCED ALGEBRA

### Spring Testing

High school students with an ACT Math score greater than or equal to 26 or a SAT Math score greater than or equal to 590 may take a test for Math 101, Math 111, or Math 112. Credit will be given for each course in which the exam was taken and successfully passed during Spring Testing. Each course is three (3) credit hours.

### Credit by Placement

Each student who is eligible by the stated placement criteria for beginning freshmen to enroll in Calculus (Math 220, 222, 230) will be awarded credit by examination in Math 111 and Math 112 if a grade of B or higher is attained in Math 220 or Math 230 for the first enrollment in the course. If such a student earns a grade of B or higher in Math 222 for the first enrollment in the course, credit by examination will be awarded in Math 111 only.

### Requirements for a Major

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 230, 231, 232	9
Humanities (GER)	
History 101, 102, 201, or 202	6
	<hr/> 29

#### Sophomore Year

Computer Literacy (GER)	
Computer Science 120	3
Social Sciences (GER)	6
Mathematics 233, 308	6
Mathematics or Statistics Elective*	3
Physics 201, 202, 261, 262	8
Humanities (GER)	
English 201 or 202	3
Electives for Minor/Concentration	3
	<hr/> 32

#### Junior Year

Arts (GER)	3
Foreign Language	6
Mathematics 307, 350, 413	9
Mathematics or Statistics Elective*	3
Natural Sciences (GER)	
Biological Sciences	3
Electives for Minor/Concentration	9
	<hr/> 33

#### Senior Year

Humanities (GER)	
English 303	3
Speech 110	3
Mathematics 318, 340, 470	9
Mathematics or Statistics Elective*	3
Electives for Minor/Concentration	6
Science Elective	3
Social Sciences (GER)	3
	<hr/> 30

Total Semester Hours ..... 124

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

\*Mathematics electives above 300, Statistics electives above 200.

### Requirements for a Minor in Mathematics

Students in other departments who wish to minor in mathematics are required to take Math 230, 231, 232, 233, and in addition 12 semester hours earned in statistics courses or mathematics courses numerically above Math 300 and Statistics 200. No more than 6 semester hours may be in statistics.

### Mechanical Engineering

The curriculum in mechanical engineering is designed to give the student a basic knowledge of the fundamentals required in the field of mechanical engineering and provide an opportunity to develop the ability to use these fundamentals in design and in the analysis and solution of technical problems. This curriculum is accredited by the Engineering

Accreditation Commission of the Accreditation Board for Engineering and Technology.

Mechanical engineering is one of the most diversified of the engineering fields. Because of this diversification, many types of careers are open to the mechanical engineer, including those in research, development, design, production, operations, maintenance, marketing, sales and administration. Most companies who come to Louisiana Tech to interview engineers typically interview mechanical engineers.

Some major fields of interest are aerospace, computers, robotics, automation and instrumentation, energy conversion, manufacturing, plant engineering, power generation, bioengineering, transportation, consulting, and environmental control. Numerous positions are available throughout the country for men and women in the field of mechanical engineering. The successful completion of the undergraduate curriculum also prepares the student to enter a program of graduate study in mechanical engineering. The student interested in the graduate program should talk to his/her advisor about graduate school in the junior year.

### Mechanical Engineering Curriculum (B.S.)

#### 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
	35
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).

\*Directed Electives, chosen by student in consultation with faculty advisor and approved by the Mechanical Engineering Program Chair, must include one course from Mechanical Engineering 413, 432, 436, 467, 469, 478, or 488.

Students receiving a grade of "D" or "F" in any mathematics, physics, chemistry, or mechanics and materials course that is a prerequisite of another required course in the curriculum, must repeat and pass the failed course(s) prior to proceeding in the curriculum.

Technical Enrichment Program: Completion of four or more Mechanical Engineering/Industrial Engineering 499 courses will satisfy the enrichment program requirements; an indication of series completion will be made on the transcript. Contact the department for more information on the Technical Enrichment Series.

### 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

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).

#### 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.

### Physics Curriculum (B.S.)

Freshman Year	
Natural Sciences (GER) .....	6
English (GER) .....	6
Humanities (GER) .....	3
Social Sciences (GER) .....	3
Mathematics (GER)	
230, 231, 232 .....	9
Physics 102, 103 .....	2
	29
Sophomore Year	
Arts (GER) .....	3
Humanities (GER) .....	6
Mathematics 233, 350 .....	6
Physics 201, 202, 261, 262, 304 .....	8

Directed Electives* .....	9
	32
<b>Junior Year</b>	
Natural Sciences (GER) .....	3
Humanities (GER) .....	3
Mathematics 410, 411 .....	6
Physics 307, 416, 417, 418, 419, 422 .....	14
Directed Electives* .....	6
	32
<b>Senior Year</b>	
Social Sciences (GER) .....	6
Physics 406, 407, 408, 409, 423, 424 .....	13
Directed Electives* .....	9
	28
<b>Total Semester Hours</b> .....	<b>121</b>

(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**

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.