# BACHELOR OF SCIENCE IN
# BIOLOGICAL SYSTEMS ENGINEERING

## WHAT IS BIOLOGICAL SYSTEMS ENGINEERING?

Biological systems engineering, broadly speaking, involves sustainable production, storage, and conversion of biomaterials into useful and valuable products. Engineers in this field will tackle real-world problems such as developing renewable biofuels and bioenergy, developing sustainable materials and bioproducts, and finding solutions to food insecurity by developing biotechnologies for the food industry and sustainable agricultural practices. In this undergraduate program, you will combine basic sciences (biology, chemistry, physics), mathematics, engineering principles and elective courses to form a concentration in either Nutritional Science, Food & Bioprocess Engineering, Agricultural Engineering or Fiber & Biopolymer Engineering.

## CAREERS IN BIOSYSTEMS ENGINEERING

Graduates from Engineering at TTU are highly sought after in a wide range of industrial sectors such as energy and fuel production, fine chemical production, pharmaceuticals, consumer products, food and biotechnology. They enter positions such as process engineer, field engineer, systems engineer, or project manager. A good number of our graduates have also engaged in research and go on to pursue graduate studies in engineering and biomedical science.

Many of our students are recruited to top companies such as Johnson & Johnson, Mars, Kraft, as well as energy companies, both in the State of Texas, and across the nation. Our full-time job placement rate at graduation was 88%, with median starting salary of $92,000. One-third of our graduates started on salaries over $100k!

## WHY STUDY BIOLOGICAL SYSTEMS ENGINEERING AT TEXAS TECH UNIVERSITY?

### ACADEMICS

The department of chemical engineering, which runs the biosystems engineering program, at Texas Tech University is one of the top-ranked amongst public institutions, and provides students with a truly rounded, hands-on experience, thanks to state-of-the-art facilities in our recently renovated Valero teaching laboratory, and the Morrow Pilot Plant. We boast small class discussion sessions in our core classes, taught by faculty members with a diverse range of expertise. We also offer an accelerated MS program in Bioengineering. Texas Tech University is located in Lubbock, West Texas, known for its friendly and welcoming people.

Learn more about our department: https://www.depts.ttu.edu/che/department/index.php

### RESEARCH OPPORTUNITIES

Undergraduate students at TTU have the unique opportunity to engage in cutting-edge research to complement their core studies. We offer students the option to gain course credit or paid research experiences, working in a variety of fields such as biomedical device engineering, biomicrofluidics, 3D printing of biomaterials, biosensors, tumor cell separation in blood flow, to name a few. Research can either be experimental lab-based, or computational.

Learn more about research here: https://www.depts.ttu.edu/che/research/index.php

### SCHOLARSHIPS

The department of chemical engineering reviews scholarship applications annually and typically awards >$150,000 per year through our accounts made possible by generous donations and endowments. Our scholarships cover both merit-based and financial need, and any scholarships we offer are in addition to any college or university scholarships!

Learn more about TTU scholarships here: https://www.depts.ttu.edu/scholarships/
Estimate tuition: Tuition Estimator | Student Business Services | TTU

### STUDENT ORGANIZATIONS

Students in our department are strongly encouraged to join the student chapter of the American Institute of Chemical Engineering (AIChE), and its subgroup, the ChemE Car Team. Members of these groups work on a variety of projects, such as volunteering events, organizing networking events with corporate sponsors, and conference attendance. Members of this group also host social events, so it is a great way to meet other students!

Learn more about the TTU chapter here: https://www.aichettu.com/

### FAST FACTS

| | |
|---|---|
| 331 | Undergraduate students, 86 graduate students |
| 18 | Faculty members (18:1 student-faculty ratio) |
| $92k | Median starting salary |
| $4000 | Average departmental scholarship |

DEPARTMENT OF
CHEMICAL ENGINEERING
TEXAS TECH
Whitacre College of Engineering

# BIOLOGICAL SYSTEMS ENGINEERING CURRICULUM 2026 - 2027

The following plan contains all the general education, core science and engineering, and concentration requirements for your BS Biological Systems Engineering degree (total = 128 credit hours). You may already have some transfer credits from high school (check here for TTU's credit transfer webpage: https://www.depts.ttu.edu/testing/uce.php.) Always be sure to consult with the academic advisor about completion of the general education requirements. All students in this program must choose a concentration in one of the following areas: (i) Nutritional Science, (ii) Food & Bioprocess Engineering, (iii) Agricultural Engineering, (iv) Fiber & Biopolymer Engineering.

| **Freshman Year (Foundational Engineering Core)** | |
|---|---|
| Fall Semester (15 hrs) | Spring Semester (17 hrs) |
| ENGR-1110 Engineering Seminar | ENGR-1330 Computational Thinking & Data Science |
| ENGR-1320 Bioinspired Design | ENGR-2392 Engineering Ethics |
| MATH-1451 Calculus I | MATH-1452 Calculus II |
| CHEM -1307/1107 Principles of Chemistry I | PHYS-1408 Principles of Physics I |
| ENGL-1301 Essentials of College Rhetoric | ENGL-1302 Advanced College Rhetoric |
| | |
| **Sophomore Year** | |
| Fall Semester (18 hrs) | Spring Semester (17 hrs) |
| **CHE-2310 Intro. Chemical Processes** | **CHE-2321 Chemical Engineering Thermodynamics I** |
| BIOL-1403 Biology I | **CHE-3315 Fluid Mechanics** |
| CHEM-1308/1108 Principles of Chemistry II | BIOL-1404 Biology II |
| MATH-2450 Calculus III | CHEM-3305/3105 Organic Chemistry I |
| POLS-1301 American Government | MATH-3350 Advanced Math for Engineers I |
| | |
| **Junior Year** | |
| Fall Semester (16 hrs) | Spring Semester (15 hrs) |
| **BSE-3363 Biochemical Engineering** | **BSE-3365 Biotransport** |
| **BSE-3394 Soft Matter Engineering** | **CHE-4372 Engineering Experimentation** |
| MBIO-3401 Microbiology (with lab) | **CHE-2306 Exposition of Technical Information** |
| POLS-2306 Texas Politics and Topics | **IE-2324 Engineering Economic Analysis** |
| NS/FDSC/PSS/NRM/ANSC Concentration Elective* | NS/FDSC/PSS/NRM/ANSC Concentration Elective* |
| | |
| **Senior Year** | |
| Fall Semester (16 hrs) | Spring Semester (14 hrs) |
| **BSE-4364 Eng. Appl. To Biosystems** | **BSE-4385 Bioprocess Control** |
| **BIOE-3202 Bioinstrumentation & Bioinformatics** | **BSE-4202 Biosystems Engineering Capstone Design II** |
| **BSE-43xx Biosystems/Biotechnology Elective** | Creative Arts Elective (multi-cultural) |
| **BSE-4201 Biosystems Engineering Capstone Design I** | HIST-3xxx History Elective |
| HIST-2300 History of the US to 1877 | NS/FDSC/PSS/NRM/ANSC Concentration Elective* |
| NS/FDSC/PSS/NRM/ANSC Concentration Elective* | |

*A minimum of 12-credit hours is required to complete a concentration, and should follow one of the following sequences:

(i) Nutritional Science: NS-3340, NS-4351, NS-4352, NS-4353
(ii) Food & Bioprocess Engineering: FDSC-3305, FDSC-3301, FDSC-3306, FDSC-4304
(iii) Agricultural Engineering: PSS-4325, PSS-4340, NRM-3330, NRM-3309 or NRM-4315
(iv) Fiber & Biopolymer Engineering: PSS-4341, PSS-4342, PSS-4343, PSS-4344
The description for each course can be found by typing the course code into the search box on the main TTU catalog here: https://catalog.ttu.edu/

## FOR MORE INFORMATION

Contact: Dr. Jeremy Marston - jeremy.marston@ttu.edu - 806.834.7012
Website: https://www.depts.ttu.edu/che/department/index.php
Department of Chemical Engineering | Texas Tech University, Box 43121 | Lubbock, TX 79409 | 806.742.3553