

## College of Engineering

# Biomedical Engineering

### Overview

Biomedical engineering applies engineering techniques to design challenges faced by the medical and life science communities. The BME program at K-State enables graduates to design electrical circuits and computer software for medical instrumentation and related devices. As one of the fastest growing degrees in the U.S., many career opportunities exist for biomedical engineering graduates.

### Professional options

#### Careers

Kansas State University graduates in biomedical engineering go on to have careers in areas such as:

- Brain computer interfaces
- Fitness devices
- Medical assistive technologies
- Medical drug delivery
- Medical implants
- Medical informatics
- Medical monitoring equipment
- Medical imaging
- Medical doctor
- Rehabilitation systems
- Surgical robots
- Telemedicine

#### Points of pride

The K-State student chapter of IEEE Engineering in Medicine and Biology Society (EMBS) has been extremely active since its founding in 2005. The EMBS chapter hosts academic and industry speakers, organizes tours and conference trips, provides support for individual and group projects, and keeps members updated on relevant opportunities from within the college and industry.

### Employers

Individuals completing the BME program find many employment opportunities with industry, government labs and educational institutions such as Cerner, Garmin, GE, Medtronic, RBC Medical Innovations, The Stowers Institute, Biomedical Devices of Kansas, National Instruments, Cardiovascular Imaging Technologies and other Midwest biomedical institutions. You also may continue your education at advanced degree levels or enter medicine, law or business administration.

### Academics

#### Degree options

BME students utilize technical electives to choose one of two areas of emphasis: biomedical sensors and devices or biomedical computation. Graduates of the program are prepared to work in the biomedical engineering industry or pursue advanced degrees, including medical school.

The objective of K-State's BME program is to provide you with the best possible education within the guidelines provided by ABET, [abet.org](http://abet.org). The biomedical engineering curricula provide:

- An understanding of basic sciences, mathematics and communication skills.
- A theoretical basis in biomedical engineering.
- The application of basic concepts to practical problems.
- Advanced skills in problem-solving involving hardware and software trade-offs.
- A strong laboratory experience stressing system design and implementation.
- A general education that complements the technical content.
- An understanding of ethical, social, safety and economic factors in engineering.
- Sequences of advanced courses that prepare students for entry-level positions.

### Undergraduate research

The College of Engineering has programs supporting undergraduate research and creative inquiry activities. Current programs include scholarships, fall and spring semester research poster forums, and department-coordinated undergraduate research funding. The department has a long history of providing excellent experiences in undergraduate research with institutions such as HeartSpring.

### Facilities

Electrical and computer engineering is located in Engineering Hall. This state-of-the-art facility provides a superior academic environment with several well-equipped instructional and research laboratories. A variety of computing resources are available to students.

### Accreditation

Following the standard ABET process for accreditation of new programs, the biomedical engineering program at K-State will see accreditation by the Engineering Accreditation Commission of ABET, [abet.org](http://abet.org), after the first graduates of the program have completed their degrees.

### Admission

Admission is selective based on academic performance. Submit your application, application fee, transcripts, and ACT or SAT scores postmarked by the priority Feb. 1 deadline. Transfer students will be considered for all terms. Freshmen will be considered only for summer and fall terms.

### Financial assistance

Nov. 1 is the priority deadline for incoming freshmen to submit the K-State scholarship application, or Feb. 1 for transfer students. Students should submit their Free Application for Federal Student Aid by March 1. For additional details, go to [k-state.edu/sfa](http://k-state.edu/sfa).

## Suggested coursework

133 hours. The following course list is only for the biomedical sensors and devices area of emphasis. Please visit [engg.k-state.edu/bme](http://engg.k-state.edu/bme) to view the biomedical computation coursework.

Effective Fall 2018

### Freshman

#### Hrs. Fall semester

0	BME 001	New Student Assembly
3	BME 200	Intro to Biomedical Engg
3	KIN 110	Intro to Public Health or
3	ECON 110	Prin Macroecon
4	CHM 210	Chemistry I
3	ENGL 100	Exposit Writing I*
4	MATH 220	Anal Geom Calc I
17		

#### Hrs. Spring semester

3	ECE 241	Intro to Computer Engg
4	MATH 221	Analytical Geometry and Calculus II
5	PHYS 213	Engineering Physics I
4	CHM 230	Chemistry II
16		

### Sophomore

#### Hrs. Fall semester

2	COMM 105	Public Speaking 1A
4	CIS 200	Prog Fundamentals
4	MATH 240	Elementary Differential Equations
5	PHYS 214	Engineering Physics II
3		Humanities/social science elective
18		

#### Hrs. Spring semester

4	BIOL 198	Principles of Biology
4	MATH 222	Analytical Geometry and Calculus III
3	CIS 300	Data Prog Structures
3	ECE 431	Microcontrollers
3	STAT 510	Intro to Prob & Stat I
17		

### Junior

#### Hrs. Fall semester

4	ECE 519	Electric Circuits and Control
8	BIOL 340	Struct Func Human Body or
8	KIN 360	Anatomy and Physiology
3	ECE 540	App Sci Computing
1	BME 490	Undergrad BME Design Exp I
16		

#### Hrs. Spring semester

3	CHM 531	Organic Chemistry I
3	ECE 512	Linear Systems
3	ECE 670	Engg Appl Mach Intell
2	BME 491	Undergrad BME Design Exp II
3	BME 451	Biomechanical Engineering
3	ENGL 415	Writ Comm Engrg
17		

### Senior

#### Hrs. Fall semester

3	BME 430	Biomaterials
1	ECE 772	Biomed Instrumentation Lec
2	ECE 773	Biomed Instrumentation Lab
3	BME 590	Senior Design Exp I
3	CIS 501	Software Arch and Design
3		Humanities/social science elective**
2		Technical elective***
17		

#### Hrs. Spring semester

3	BME 674	Medical Imaging
3	BME 575	Clinical Systems Engineering
3	BME 591	Senior Design Exp II
3		Technical elective***
3		Technical elective***
15		

\* Students must complete the appropriate prerequisite credits for ENGL 415, but may apply only 3 hours of ENGL 415 prerequisite credits toward degree requirements.

\*\* Humanities and Social Science electives are to be selected from the approved College of Engineering H&SS list. Students should select these courses as needed to complete the requirements of the K-State 8 General Education program.

\*\*\* Technical Electives must be selected to complete one of the areas of emphasis. Technical Electives must come from the approved technical electives list.

#### C-prerequisite Policy:

For the good and benefit of the student and their future employer, the ECE department enforces a C-prerequisite policy for all courses listed by number in the biomedical engineering curriculum and for any in-major technical elective course applied toward the degree. A grade of C or better must be earned in all prerequisites to such a course before enrolling in that course.

#### Transfer Course Policy:

No more than twelve (12) credit hours of courses in electrical engineering, computer engineering, or biomedical engineering may be transferred to Kansas State University for credit toward a bachelor's degree in biomedical engineering. Further, those courses selected for transfer credit must be equivalent to courses in the list below and must be such that the prerequisites for the listed course are also satisfied. Any courses transferred must be taken from ABET accredited programs: ECE 210, ECE 241, ECE 410, ECE 511, ECE 512, ECE 519, ECE 590/591, ECE 772, BME 200, BME 430, BME 490/491, BME 551, BME 575, and BME 674.

### For more information about biomedical engineering, contact:

Department of Electrical and Computer Engineering  
College of Engineering  
3108 Engineering Hall  
1701D Platt St.  
Manhattan, KS 66506-5201  
785-532-5600  
[kstateengg@k-state.edu](mailto:kstateengg@k-state.edu)  
[engg.k-state.edu](http://engg.k-state.edu)

### For more information about engineering, contact:

Office of Recruitment  
College of Engineering  
1141 Engineering Hall  
1701D Platt St.  
Manhattan, KS 66506-5201  
785-532-5455  
[kstateengg@k-state.edu](mailto:kstateengg@k-state.edu)  
[engg.k-state.edu](http://engg.k-state.edu)



### For more information about Kansas State University, contact:

Office of Admissions  
Kansas State University  
119 Anderson Hall  
919 Mid-Campus Drive North  
Manhattan, KS 66506-0102  
1-800-432-8270 (toll free) or  
785-532-6250  
[k-state@k-state.edu](mailto:k-state@k-state.edu)  
[k-state.edu/admissions](http://k-state.edu/admissions)

**KANSAS STATE**  
UNIVERSITY

Notice of nondiscrimination  
Kansas State University prohibits discrimination on the basis of race, color, ethnicity, national origin, sex (including sexual harassment and sexual violence), sexual orientation, gender identity, religion, age, ancestry, disability, genetic information, military status, or veteran status, in the University's programs and activities as required by applicable laws and regulations. The person designated with responsibility for coordination of compliance efforts and receipt of inquiries concerning nondiscrimination policies is the University's Title IX Coordinator: the Director of the Office of Institutional Equity, [equity@k-state.edu](mailto:equity@k-state.edu), 103 Edwards Hall, Kansas State University, Manhattan, Kansas 66506, (785) 532-6220. The campus ADA Coordinator is the Director of Employee Relations, [charlott@k-state.edu](mailto:charlott@k-state.edu), who may be reached at 103 Edwards Hall, Kansas State University, Manhattan, Kansas 66506, (785) 532-6277.

Post-Graduation Statistics  
[k-state.edu/postgrad-stats](http://k-state.edu/postgrad-stats)  
[ksdegreestats.org](http://ksdegreestats.org)