

Master of Science in Bioengineering

Bioengineering

The bioengineering program prepares students to become leading researchers, educators, and entrepreneurs. The program provides knowledge breadth in engineering and the biological sciences and knowledge depth in the student's area of research interest. The program offers the Master of Science and Doctor of Philosophy degrees in bioengineering and the M.D./Ph.D. combined degree in conjunction with the KU School of Medicine (<http://medicine.kumc.edu/>). Students have access to innovative research and educational facilities on KU's Lawrence and KU Medical Center campuses. The student selects from 6 tracks:

1. Bioimaging
2. Computational bioengineering
3. Biomaterials and tissue engineering
4. Biomechanics and neural engineering
5. Biomedical product design and development
6. Biomolecular engineering

The student, in consultation with his or her advisor and advisory committee, develops a Plan of Study and a research program to satisfy degree requirements.

The program's goals are:

1. To give students an in-depth understanding of mathematics, engineering principles, physics, chemistry, physiology, and modern biology.
2. To train students to apply basic sciences to biological problems using engineering principles.
3. To train students to do bioengineering research and solve problems related to the design and development of diagnostic and therapeutic technologies that improve human health.
4. To train students to apply bioengineering research to commercially viable technologies.

Bioengineering research projects typically focus on 1 of 2 broad categories:

1. The development of fundamental scientific knowledge.
2. The development and application of materials, devices, and systems with the goal of improving biological processes, systems, and health care.

Bioengineering students are often involved in measurements, analysis, modeling, computations, design, and development. The program prepares students for careers in industry, academia, health care settings, or government.

Financial Aid

Once admitted, students become eligible for financial aid. Graduate students in the bioengineering program are often supported through research assistantships, teaching assistantships, or fellowships (e.g., the Madison and Lila Self Fellowship). Research assistantships are arranged by the student and faculty advisor with assistance from the Bioengineering Director if needed. Teaching assistantships are assigned by the

Bioengineering Director. Highly qualified applicants are considered for additional support and fellowships. For more information about external and other KU funding options, please visit <https://graduate.ku.edu/funding> (<https://graduate.ku.edu/funding/>).

Standard Admission Requirements for all Graduate Programs

- All applicants must meet the requirements outlined in the Admission to Graduate Study (<https://policy.ku.edu/graduate-studies/admission-to-graduate-study/>) policy.
- Bachelor's degree: A copy of official transcripts showing proof of a bachelor's degree (and any post-bachelor's coursework or degrees) from a regionally accredited institution, or a foreign university with equivalent bachelor's degree requirements is required.
- English proficiency: Proof of English proficiency (<https://gradapply.ku.edu/english-requirements/>) for non-native or non-native-like English speakers is required. There are two bands of English proficiency, including Admission and Full proficiency. For applicants to online programs, Full proficiency is required.

Admission to the Bioengineering Graduate Program

All applicants are expected to have an undergraduate grade point average of 3.0 or higher on a 4.0 scale. The appropriate academic preparation includes both general and track prerequisites. General prerequisites include calculus I and II, differential equations, linear algebra, general physics I and II, chemistry, and biology. Track prerequisites depend on the student's track of study. More complete details about academic preparation can be found on the program's website (<http://bio.engr.ku.edu/>).

Applicants normally have a B.S. and/or an M.S. degree in an engineering discipline, physical sciences, the life sciences, or a closely related field. Depending on their preparation, students may be required to take additional courses that may or may not count toward the graduate degree.

A student may be admitted to the Bioengineering Program without meeting all the prerequisites if approved by the Admissions Committee. This student must plan to complete the prerequisites in addition to the graduate degree requirements and consultation with the program is required to determine which courses satisfy these requirements. Course credits from prerequisites generally do not apply toward the graduate degree and must be completed with a grade of B or higher.

A highly qualified applicant may apply for admission directly into the Ph.D. program after completing the B.S. degree. Generally, a student who does not have an undergraduate degree in an engineering discipline must complete the M.S. before entering the Ph.D. program. A strong applicant should have outstanding academic credentials, some formal research experience, research interests that fit one of the tracks of study, and a strong potential for advanced study.

Submit your graduate application online (<https://gradapply.ku.edu/apply/>).

Application Information & Deadlines

In order to receive full consideration, a complete application package should be submitted by the following deadlines:

Fall Admission: December 1

Spring Admission: October 1

APPLICATION MATERIALS INCLUDE:**1. Official Transcripts**

- a. One official transcript from each degree granting institution that the student has attended is **REQUIRED** for admission. If courses from another university or junior college appear on the degree granting institution's transcript, we do not need transcripts from the other university or junior college. A scanned copy of the official transcript IS acceptable but it MUST be an official copy. Printouts from student portals or websites will **NOT** be accepted. A final degree conferred transcript sent directly from the degree granting university will be required before the second semester of enrollment should the applicant be admitted and enroll in a program at KU.

2. Letters of Recommendation

- a. Request 3 letters of recommendation from individuals who can speak to your academic and research preparedness. Include the correct e-mail addresses of your recommenders on your online application. An e-mail request with instructions on how to complete the required Recommendation Form and upload their letter to your application electronically will be sent to these recommenders.

3. A Statement of Your Academic Objectives

- a. Your statement is a very important part of your application. Please write a 1-2 page essay describing your academic and career objectives as they relate to bioengineering. It should indicate how and why you have decided to pursue graduate studies in your chosen field. ***Please discuss the particular areas of focus within the track(s) you wish to study and why you feel KU specifically is a good fit for your particular interests and goals.*** If you are interested in the research of particular KU faculty members, please identify and discuss. You may also include relevant information about your academic background, research experience, leadership skills, related work and/or volunteer experiences that you feel have prepared you for graduate study. This statement of objectives will be read and used by faculty in the track to evaluate your academic, research and leadership potential as well as to select graduate teaching and/or research assistants. It also plays a role in determining scholarship/fellowship nominations. Please make sure that it is of high quality and demonstrates your readiness for graduate level study and research at KU.

4. Your Curriculum Vitae (CV) or Resume**5. English Proficiency Scores (if English is NOT your native language)**

- a. TOEFL, iBT (or IELTS) Scores (sent to us directly from the testing agency).
 - i. **The institution code for the University of Kansas is 6871.**
 - ii. **The program/department code is 1603.**
 - iii. **The department code is 69 for iBT.**

b. NOTES:

- i. For REGULAR admission: All section scores must be at least 20 on the internet-based and computer based TOEFL.
- ii. Admission will NOT be granted if you do not meet the above standard of English Proficiency. Due to a change in policy, we are no longer able to issue an I-20 for these instances.
- iii. To qualify for a GTA offer, you must score at least a 24 on the SPEAKING portion of the iBT and/or score a 50 on the SPEAK test (administered at KU after you arrive).

- iv. For more information regarding English Proficiency Requirements (<http://graduate.ku.edu/english-proficiency-requirements/>), see the graduate studies website.

6. Proof of Financial Support (International Applicants ONLY)

- a. Obtain the proper Financial Documentation. Scan the document and save it as a pdf file. **KEEP THE PAPER COPIES. Be prepared to send the paper copies to the program office at the address below if requested!** Although the financial statement is not required for making admission decisions, the U.S. Department of State mandates that evidence of financial resources, such as an official bank statement, be provided in order to issue an I-20 and student visa. It should have the name of the student on the account, not the parent's name or any other name. See the International Support Services (<https://iss.ku.edu/proof-finances/>) website for more information.

Funding

Scholarships/Fellowships - The Bioengineering graduate admissions committee nominates applicants for University and School of Engineering scholarships and fellowships based on academic merit and other selection criteria, as specified by the fellowship selection committees.

Graduate Teaching Assistantships (GTAs) - Teaching Assistantships are available and are awarded competitively based on academic qualifications. You do not need a separate application to be considered.

Graduate Research Assistantships (GRAs) - Students work with their potential academic advisor/mentor to obtain a funded position on a research project at the time of matriculation or within the first year. It is NOT required for prospective students to have KU faculty pledge a GRA position prior to your admission.

Visit Us

The graduate program staff are happy to work with all prospective students in determining the fit between the student and the program. We feel that visiting our campus in Lawrence is a very important step. In order to facilitate your visit to KU, there are two main options:

The first, and most preferred, option entails simply applying for admission to the program. All prospective students are welcome to attend our Open House in October or mid-March. Eligible admitted students may be invited to participate in Campus Sneak Peek in late February (prior to the fall semester of your intended matriculation). These organized campus visit opportunities will allow you to gather a great deal of first-hand information which we hope will help you in making a final decision about whether to attend KU.

The second option is making arrangements to visit us on your own, outside of organized events. With early notification, we will do our best to work with you to provide information and schedule appointments with faculty when possible. Please contact us if you feel that this is the best option for you.

Contact Information

Please contact Graduate Program Coordinator at bioe@ku.edu or (785) 864-5258 to schedule a visit or with questions about the Bioengineering application process.

M.S. Degree Requirements

In addition to general rules and regulations, the student must meet the program's M.S. requirements. Requirements for the M.S. include course work, a thesis, and a final oral examination.

In the first semester, the student selects a track of study, an advisor, and an advisory committee. The advisory committee guides the student's development through the Plan of Study (<https://engrgradplan.ku.edu/>) in the chosen track, helps the student select a topic for research leading to the thesis, and participates in the final oral examination. Should the student's interests change, the advisory committee membership may be changed accordingly, with the approval of the program's Graduate Studies Director.

The student's advisory committee consists of a minimum of 3 graduate faculty members and is chaired by the student's advisor. A more detailed description is available on the program's website (<http://bio.engr.ku.edu/>).

Course Requirements

The M.S. program requires a minimum of 30 credit hours* beyond the B.S. to meet degree requirements.

- Core Courses (6 hours)
- Track Courses (18 hours) Students must complete the depth, breadth, and elective courses required in the chosen track (see the program's website (<http://bio.engr.ku.edu/>) for track requirements).
- Research (6 hours)

*No more than 9 credits may be taken at the 500-600 level for this degree. No course graded CR or NC (credit/no-credit) can count toward the satisfaction of the degree requirements.

Plan of Study

Students are expected to complete a Plan of Study before beginning the second semester of graduate study. To complete a Plan of Study, a student should have identified a research advisor and thesis committee. Students should work with their research advisors to identify an appropriate list of courses that fulfill degree requirements and support the student's educational and research objectives. A Plan of Study can be completed online (<https://engrgradplan.ku.edu/>). The advisor, committee members, and graduate studies director must approve the Plan of Study. The Plan of Study can be modified later, if needed, with approval of the advisor, committee members, and Graduate Studies Director. Students are required to complete their masters degree within 7 years from initial enrollment in the program, but typically finish within 2-3 years. A timeline is available here (<https://bioengr.ku.edu/sites/bioengr/files/documents/Docs/forms%20and%20docs/Masters%20Timeline.pdf>).

Thesis and Final Examination

The M.S. student is expected to conduct original research, prepare a written thesis detailing the results, and defend the thesis in a final oral examination. The research generally is expected to be of sufficient quality to permit publication in reputable scientific journals. The final oral examination is scheduled when the advisory committee agrees that the research is complete.

At the completion of this program, students will be able to:

- Read, comprehend, process and communicate (written and orally) scientific literature in the bioengineering field.

- Execute scientific research aims including developing methods to achieve the aims. This includes an ability to conduct appropriate physical and/or numerical experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Demonstrate a depth of knowledge of fundamental topics in the student's track of study (biomechanics and neural engineering, biomaterials and tissue engineering, bioimaging, bioinformatics, biomolecular, or biomedical product design and development). Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- Complete original, publishable, and impactful research in a bioengineering area.
- Recognize ethical and professional responsibilities and make decisions or take actions that are appropriate.