BIOENGINEERING, MS

Overview

for the degree of Master of Science in Bioengineering

The Department of Bioengineering offers both an MS with thesis and an MS non-thesis program. Students in the MS with thesis program are required to have a research advisor and competitive applicants are encouraged to review the research websites and publications of those bioengineering graduate program faculty (https://bioengineering.illinois.edu/people/faculty/grad-program/) they are most interested in working with.

Department Research

The Department of Bioengineering offers studies leading to the Master of Engineering in Bioengineering (MEng), the Master of Science in Bioengineering (MS), Master of Science in Biomedical Image Computing (MS in BIC), and the Doctor of Philosophy (PhD) in Bioengineering. The Bioengineering Graduate Program provides students with educational and research experiences that integrate the sciences of biology and medicine with the practices and principles of engineering. For the MS and PhD programs, areas of focus include Bio-Imaging at Multi-Scale, Bio-Micro and Nanotechnology, Computational and Systems Bioengineering, Molecular, Cellular and Tissue Engineering, Neural Engineering, Research in BME Education and Synthetic Bioengineering. In addition to Bioengineering faculty, the Department of Bioengineering has more than 50 affiliate faculty (https://bioengineering.illinois.edu/people/faculty/grad-program/).

Degree Requirements

for the degree of Master of Science in Bioengineering

For additional details and requirements for all degrees, please refer to the department's Graduate Studies website (http://bioengineering.illinois.edu/) and the Graduate College Handbook (http://grad.illinois.edu/gradhandbook/).

Thesis Option

Code	Title	Hours
Professional Development		**4**
BIOE 500	Graduate Seminar (two semesters)	2
BIOE 502	Bioengineering Professionalism	2
Thesis Research		**4**
BIOE 599	Thesis Research (min-max applied toward degree)	4
Technical Elective Courses		**12**
Selected in consultation with advisor		12
Fundamental Courses		**12**
Students must select one course from each of the three categories below		12
Statistics and Data Science		
ASRM 555	Advanced Predictive Analytics	4
BIOE 484	Statistical Analysis of Biomedical Images	4
BIOE 505	Computational Bioengineering	4
IB 501	Programming for Genomics	4
STAT 510	Mathematical Statistics	4
STAT 511	Advanced Mathematical Statistics	4
STAT 525	Topics in Computational Statistics	4
STAT 527	Advanced Regression Analysis	4
STAT 528	Advanced Regression Analysis II	4
STAT 530	Bioinformatics	4
STAT 533	Advanced Stochastic Processes	4
STAT 542	Statistical Learning	4
STAT 543	Appl. Multivariate Statistics	4
STAT 545	Spatial Statistics	4
STAT 546	Machine Learning in Data Science	4
STAT 551	Theory of Probability I	4
STAT 552	Theory of Probability II	4
STAT 553	Probability and Measure I	4
STAT 554	Probability and Measure II	4
STAT 555	Applied Stochastic Processes	4
STAT 556	Advanced Time Series Analysis	4
STAT 558		4
STAT 571	Multivariate Analysis	4
STAT 575	Large Sample Theory	4
STAT 576	Empirical Process Theory and Weak Convergence	4
STAT 578	Topics in Statistics	4
STAT 587	Hierarchical Linear Models	4
STAT 588	Covar Struct and Factor Models	4
Engineering Math		
BIOE 432	Systems Biology: Uncovering Design Principles of Biological Networks	3 or 4
BIOE 450	Introduction to Quantitative Pharmacology	3 or 4
BIOE 485	Computational Mathematics for Machine Learning and Imaging	4
BIOE 504	Analytical Methods in Bioeng	4
Life Sciences		
BIOE 430	Intro Synthetic Biology	4
BIOE 434	Immunoengineering	3 or 4
BIOE 487	Stem Cell Bioengineering	4
BIOE 526	Advances in Biotechnology	4
Total Hours		**32**

Other Requirements and Conditions

Requirement	Description
Minimum GPA:	3.0
A minimum of 12 hours of 500-level coursework is required	12

Non-Thesis Option

Code	Title	Hours
Professional Development		**4**
BIOE 500	Graduate Seminar (two semesters)	2

BIOE 502	Bioengineering Professionalism	2
Technical Elective Courses		**24**
Selected in consultation with advisor		24
Fundamental Courses		**12**
Students must select one course from each of the three categories below		12
Statistics and Data Science		
ASRM 555	Advanced Predictive Analytics	4
BIOE 484	Statistical Analysis of Biomedical Images	4
BIOE 505	Computational Bioengineering	4
IB 501	Programming for Genomics	4
STAT 510	Mathematical Statistics	4
STAT 511	Advanced Mathematical Statistics	4
STAT 525	Topics in Computational Statistics	4
STAT 527	Advanced Regression Analysis	4
STAT 528	Advanced Regression Analysis II	4
STAT 530	Bioinformatics	4
STAT 533	Advanced Stochastic Processes	4
STAT 542	Statistical Learning	4
STAT 543	Appl. Multivariate Statistics	4
STAT 545	Spatial Statistics	4
STAT 546	Machine Learning in Data Science	4
STAT 551	Theory of Probability I	4
STAT 552	Theory of Probability II	4
STAT 553	Probability and Measure I	4
STAT 554	Probability and Measure II	4
STAT 555	Applied Stochastic Processes	4
STAT 556	Advanced Time Series Analysis	4
STAT 558		4
STAT 571	Multivariate Analysis	4
STAT 575	Large Sample Theory	4
STAT 576	Empirical Process Theory and Weak Convergence	4
STAT 578	Topics in Statistics	4
STAT 587	Hierarchical Linear Models	4
STAT 588	Covar Struct and Factor Models	4
Engineering Math		
BIOE 432	Systems Biology: Uncovering Design Principles of Biological Networks	3 or 4
BIOE 450	Introduction to Quantitative Pharmacology	3 or 4
BIOE 485	Computational Mathematics for Machine Learning and Imaging	4
BIOE 504	Analytical Methods in Bioeng	4
Life Sciences		
BIOE 430	Intro Synthetic Biology	4
BIOE 434	Immunoengineering	3 or 4
BIOE 487	Stem Cell Bioengineering	4
BIOE 526	Advances in Biotechnology	4
Total Hours		**40**

Other Requirements and Conditions

Requirement	Description
Minimum GPA:	3.0
A minimum of 12 hours of 500 level coursework is required	12

Learning Outcomes

for the degree of Master of Science in Bioengineering

Thesis Option

1. Ability to apply **quantitative skills and engineering principles** to propose novel and practical solutions to medical/human health problems.
2. Understanding of **professional and ethical responsibilities.**
3. Ability to **communicate** scientific problems and solutions, as well as their impact, effectively to a diverse audience and stakeholders, both orally and in writing.
4. Demonstrate moderate **technical** mastery in chosen research area, shown by the ability to identify an important scientific problem, formulate a hypothesis, and design experiments to conduct research and data analysis to test the hypothesis. The student should also be able to formulate alternatives.
5. Develop effective **leadership** skills in order to foster the ability to conduct **collaborative** research and work with a diverse team.

Non-Thesis Option

1. Ability to apply quantitative skills and engineering principles to propose novel and practical solutions to medical/human health problems.
2. Understanding of professional and ethical responsibilities.
3. Ability to communicate scientific problems and solutions, as well as their impact, effectively to a diverse audience and stakeholders, both orally and in writing.
4. Demonstrate moderate conceptual mastery in chosen research area, with the capability of expanding it into a future research project in preparation for an industry career or PhD degree.
5. Develop effective leadership skills in order to foster the ability to conduct collaborative research and work with a diverse team.

Admissions & Financial Aid

for the degree of Master of Science in Bioengineering

Admission Requirements

Applicants should have an undergraduate or graduate degree in a natural science, computer science, or engineering. A minimum grade point average of 3.00 (A = 4.00) for the last two years of undergraduate study is required. Applicants should show evidence of strong quantitative skills and of serious interest in the life sciences. GRE scores are optional.

Financial Aid

Qualified students may apply for financial aid in the form of fellowships, teaching and research assistantships, and waivers of tuition and service fees.

All applicants, regardless of US citizenship, whose native language is not English and who wish to be considered for teaching assistantships

must demonstrate spoken English language proficiency (http://grad.illinois.edu/admissions/taengprof.htm) by achieving a minimum score of 24 on the speaking subsection of the TOEFL iBT or 8 on the speaking subsection of the IELTS. For students who are unable to take the TOEFL iBT or IELTS, a minimum score of 3 is required on the OEAI test, (https://linguistics.illinois.edu/testing/oral-english-assessment-interview-oeai-ita-certification-test/) offered on campus. All new teaching assistants are required to participate in the Graduate Academy for College Teaching (https://citl.illinois.edu/graduate-academy-college-teaching/) conducted prior to the start of the semester.

Contact Information

for the degree of Master of Science in Bioengineering

Department of Bioengineering

Interim Department Head: S (maa@illinois.edu)huming Nie (nies@illinois.edu)
Director of Graduate Studies: Wawrzyniec Dobrucki (dobrucki@illinois.edu)
Bioengineering website (https://bioengineering.illinois.edu/)
Program website (https://bioengineering.illinois.edu/academics/graduate/ms/)
1240 Everitt Laboratory, 1406 W Green St, Urbana, IL 61801
(217) 300-8066
bioe-gradprograms@illinois.edu

Grainger College of Engineering

Grainger College of Engineering website (https://grainger.illinois.edu/)

Admissions

Graduate Contact: Karin Readel (kereadel@illinois.edu)
Department Admissions & Requirements (https://bioengineering.illinois.edu/admissions/graduate/ms/)
Graduate College Admissions & Requirements (https://grad.illinois.edu/admissions/apply/)