Bioengineering MSBioe

COLLEGE OF ENGINEERING

Learn more about the Master of Science in Bioengineering.

About the Program

The MSBioe program offers students graduate-level interdisciplinary education and research opportunities in bioengineering and engineering applications in related healthcare fields. The program offers concentrations in Bioelectronics, Biomaterials, and Biomechanics. Graduates of the program are prepared for careers in industry or may choose to pursue a program of study leading to the PhD degree. The program offers research opportunities in collaboration with faculty in the College of Science and Technology and the Lewis Katz School of Medicine.

Time Limit for Degree Completion: 5 years

Campus Location: Main. Students may also take a significant number of required and elective courses at the Health Sciences Center campus.

Full-Time/Part-Time Status: The degree program can be completed on a full- or part-time basis.

Interdisciplinary Study: The program encourages interdisciplinary research with other branches of engineering as well as with various departments of the College of Science and Technology and the Lewis Katz School of Medicine.

Areas of Specialization: For each of the three areas of specialization, research includes:

- Bioelectronics – sensor development and image analysis
- Biomaterials – wear of ultra-high molecular weight polyethylene, polymer chemistry and interfacial chemistry
- Biomechanics – computer-aided design of composite biomaterials, mechanical properties of orthopedic implant materials, design of orthopedic implants, and modeling of biomaterial behavior

For the MSBioe program, students also choose between three tracks:

1. The Thesis Track is intended for students pursuing advanced research and includes 24 credits of didactic coursework, 3 credits of Project (BIOE 9995), and 3 credits of Thesis (BIOE 9996).
2. The Project Track introduces students to applied research and includes 27 credits of didactic coursework and 3 credits of Project (BIOE 9995).
3. The Coursework Track provides students with an advanced engineering background for their future in the engineering profession through 30 credits of didactic coursework.

In the first term, the student and the Bioengineering (BIO) Graduate Program Director establish a graduate Plan of Study that outlines all required courses and the sequence for the student to follow. This form is used to track the student's progress as the various benchmarks in the program are completed. Once established, any revisions to the Plan of Study require approval in advance. However, if considering whether to change one's track, the student should note that:

- "Thesis" credits (BIOE 9996) can only be applied toward the Thesis MSBioe Track and cannot be applied to either the Project or Coursework Tracks.
- "Project" credits (BIOE 9995) can be applied toward the Thesis and Project MSBioe Tracks but cannot be used for the Coursework Track.

Job Prospects: Graduates with the MSBioe degree are employed in a variety of biomedical industries ranging from device manufacturers to design engineering. Other possibilities include careers in government, either in regulatory agencies or with the U.S. Patent and Trademark Office. Students who complete the MSBioe degree with a thesis are prepared to enter a doctoral program.

Non-Matriculated Student Policy: Up to 9 credits of graduate Engineering coursework may be taken at Temple University on a non-matriculated basis and subsequently applied to the MSBioe degree upon admission. If the applicant's undergraduate GPA was less than 3.0, a GPA of 3.25 or better is required on this non-matriculated graduate coursework to receive an admissions exception. Consequently, the BIO Graduate Program Director may encourage those with an undergraduate GPA less than 3.0 to take their first three graduate courses prior to making formal application to the MSBioe program. (See the relevant Graduate School policies on special admission procedures for non-matriculated students: 02.23.11.03 and 02.24.19.)

Financing Opportunities: Three forms of financial aid are offered to graduate students:

1. Teaching Assistantship (TA): TA awards are made solely by the Department and require the awardee to work 20 hours per week in support of the Department's undergraduate programs. The TA is compensated with a 9-month stipend, a basic health-insurance plan, and 9 credits per term of tuition remission.

2. Research Assistantship (RA): Individual Bioengineering faculty confer RA awards, using their research funds, upon students who appear well-qualified to carry out the research. Typically, this faculty member becomes the RA's Thesis advisor. The RA normally works up to 20 hours per week and is compensated with a stipend, basic health insurance, and tuition remission.
3. Fellowships: These highly competitive University-wide grants are typically awarded only to PhD-program applicants.

Admission Requirements and Deadlines

Application Deadline:

Fall:

- March 1 (International)
- June 1 (Domestic)

Spring: November 1

Applications are processed on a continual basis. Late applications may be considered for admission. Ordinarily, the applicant is informed of an admissions decision within 4 to 6 weeks of receipt of all supporting application documents.

APPLY ONLINE to this graduate program.

Review tuition and financial assistant deadlines to ensure financial aid consideration for the intended term of study.

Applicants who plan to matriculate full-time are automatically considered for financial aid awards so no separate application for financial aid is required.

Both admissions and financial aid award decisions originate in the Bioengineering Department. Applicants are encouraged to contact the BIO Graduate Program Director for advice and consultation in the application process.

Letters of Reference:
Number Required: 3

From Whom: Letters of recommendation should be obtained from college or research faculty who are familiar with the applicant's competency. If the applicant has an established career in engineering, one of the letters should be provided by the applicant's immediate supervisor. Any applicant who has been out of school long enough that relevant academic reference letters appear impractical should contact the BIO Graduate Program Director to obtain a waiver of this admission requirement.

Coursework Required for Admission Consideration: Students not adequately prepared for advanced courses may be required to take a number of prerequisites. The Bioengineering Department identifies the needed coursework on a case-by-case basis.

Bachelor's Degree in Discipline/Related Discipline: A bachelor's degree in Bioengineering or a related discipline is the preferred prerequisite degree. However, students who have earned a bachelor's degree in a related field are encouraged to apply, with the understanding that remedial preparatory courses may be a pre-condition of admission to the MSBioe program.

University regulations stipulate that the applicant must have earned a 3.0 grade-point average on a 4.0 scale in their undergraduate studies, but admission exceptions are made for a variety of circumstances. (See Graduate School Policy 02.23.11.03.) The BIO Graduate Program Director helps the applicant navigate the admission possibilities, including the "Non-Matriculated Student Policy" option.

Official transcripts from all institutions of higher education attended, whether or not a degree was awarded, must be submitted. International applicants submit official transcripts or official NACES-accredited evaluation documentation that validates completion and conferral of a degree, diploma and/or certificate. All applicants must ensure transcripts and/or NACES-accredited documentation are sent directly from the institution(s) or NACES-accredited evaluation agency via email to gradengr@temple.edu or to the Temple University College of Engineering, 1947 N. 12th Street, Philadelphia, PA 19122-6077.

Statement of Goals: Describe your relevant technical experiences and career goals in one to two pages.

Standardized Test Scores:
GRE: Optional. If reported, scores that are not more than 5 years in advance of the application date are sent to test code 2945. (See Graduate School Policy 02.23.12.)

Applicants who earned their baccalaureate degree from an institution where the language of instruction was other than English, with the exception of those who subsequently earned a master’s degree at a U.S. institution, must ensure official scores are reported directly by the testing agency for a standardized test of English and meet one of these minimums:

- TOEFL iBT: 79
- IELTS Academic: 6.5

- PTE Academic: 53
- Duolingo: 110

Resume: Current resume required.

Transfer Credit: Graduate credits taken at an accredited institution prior to matriculation may be transferred into the MSBioe program. In order to transfer, the courses must be equivalent to courses offered at Temple in the student's area of study and research, and the grades must be "B" or better. The maximum number of credits a student may transfer is 6. (See Graduate School Policy 02.24.21.)

Program Requirements

General Program Requirements:
Number of Credits Required Beyond the Baccalaureate: 30

Required Courses:

Thesis Track

Code	Title	Credit Hours
Core Courses		
BIOE 5600	Bioengineering Graduate Seminar [1]	0
ENGR 5011	Engineering Mathematics I	3
Specialty Courses		
Select three from the following:		9
BIOL 5312	Biostatistics	
BIOE 5719	Introduction to Bioengineering	
BIOE 5721	Cell Biology for Engineers	
BIOE 5737	Systems Physiology for Engineers	
Electives [2]		**12**
Research Courses		
BIOE 9995	BioEngineering Project Research	3
BIOE 9996	BioEngineering Thesis Research	3
Total Credit Hours		**30**

1 BIOE 5600 Bioengineering Graduate Seminar is required to be taken each academic term while completing the degree.
2 Coursework may include up to, but no more than, 3 credits of ENGR 9182 Independent Study I or 3 credits of BIOE 9991 Directed Research. Furthermore, students who wish to take graduate coursework outside the College of Engineering in one of Temple University's other schools/colleges need to obtain the appropriate written approvals on their Plan of Study form.

Project Track

Code	Title	Credit Hours
Core Courses		
BIOE 5600	Bioengineering Graduate Seminar [1]	0
ENGR 5011	Engineering Mathematics I	3
Specialty Courses		
Select three from the following:		9
BIOL 5312	Biostatistics	
BIOE 5719	Introduction to Bioengineering	
BIOE 5721	Cell Biology for Engineers	
BIOE 5737	Systems Physiology for Engineers	
Electives [2]		**15**
Research Course		
BIOE 9995	BioEngineering Project Research	3
Total Credit Hours		**30**

1 BIOE 5600 Bioengineering Graduate Seminar is required to be taken each academic term while completing the degree.
2 Coursework may include up to, but no more than, 3 credits of ENGR 9182 Independent Study I or 3 credits of BIOE 9991 Directed Research. Furthermore, students who wish to take graduate coursework outside the College of Engineering in one of Temple University's other schools/colleges need to obtain the appropriate written approvals on their Plan of Study form.

Coursework Track

Code	Title	Credit Hours
Core Courses		
BIOE 5600	Bioengineering Graduate Seminar [1]	0
ENGR 5011	Engineering Mathematics I	3
Specialty Courses		
Select three from the following:		9
BIOL 5312	Biostatistics	
BIOE 5719	Introduction to Bioengineering	
BIOE 5721	Cell Biology for Engineers	
BIOE 5737	Systems Physiology for Engineers	
Electives [2]		**18**
Total Credit Hours		**30**

1 BIOE 5600 Bioengineering Graduate Seminar is required to be taken each academic term while completing the degree.
2 Coursework may include up to, but no more than, 3 credits of ENGR 9182 Independent Study I or 3 credits of BIOE 9991 Directed Research. Furthermore, students who wish to take graduate coursework outside the College of Engineering in one of Temple University's other schools/colleges need to obtain the appropriate written approvals on their Plan of Study form.

Culminating Events:

Thesis Track:

The culminating events in the Thesis Track are typically undertaken during the last two successive terms of study. Successful completion requires the following:

- Thesis Proposal — BIOE 9995 BioEngineering Project Research (3 credits)
  Under the guidance of the advisor, the student conducts independent research on an applied engineering topic of current interest and registers for BIOE 9995. This work includes the research and preliminary results that form the basis of an extended study that the student plans to carry on in BIOE 9996 BioEngineering Thesis Research in the following term. The student submits a research report as their Thesis Proposal to a committee consisting of three or more faculty members, including the faculty advisor, and presents their proposal in an open College-wide seminar, which is scheduled and posted at least 10 business days in advance of the presentation date. Immediately following the presentation, the student's advisory committee questions the student about the details and strategy of the proposed research. The committee then accepts, accepts with revisions, or rejects the proposal.
  The student must pass the Thesis Proposal before registering for BIOE 9996. If the student fails Thesis Proposal, they may either re-register for BIOE 9995 (1 credit) in the next regular term and repeat the entire proposal process or consider switching to the Project or Coursework Track. *NOTE: A second failure of Thesis Proposal results in automatic dismissal from the University.* If switching to another track, the Plan of Study form requires updating and appropriate approvals.
- Thesis Defense — BIOE 9996 BioEngineering Thesis Research (3 credits)
  The student should register for BIOE 9996 in the term that they plan to defend the thesis. The thesis document should be prepared in a format compliant with University standards. (See Graduate School Policy 02.26.12.02.) Two weeks prior to the thesis defense, the student provides the committee with a copy of the completed thesis and posts an announcement of the defense, which is to take place during a regular academic term (i.e., not scheduled during study days, final exams, or the breaks between terms). If the student is to graduate in the same term as the thesis defense is held, then the defense should take place at least 30 days prior to the end of the term.
  The thesis defense is an open College seminar in which the student presents the concepts and results of their research. Immediately following the defense, the thesis committee convenes to closely examine the student's research and decide to accept the thesis as provided, accept the thesis with revisions, or not accept the thesis. If the thesis is accepted, a letter grade for BIOE 9996 is assigned. If the thesis is accepted with revisions, then the student must submit the revised thesis within 30 days and with the approval of the Thesis Committee. If the thesis is not accepted, but the committee decides to not fail the student, an "R" grade is assigned to BIOE 9996. In the following term, the student registers for one credit of ENGR 9991 Directed Research until they are again prepared to attempt the defense. The defense procedures described above are then carried out again in the term that the student is prepared to defend the thesis.

Project Track:

The culminating event for the Project Track is BIOE 9995 BioEngineering Project Research. This entails a one-term research activity done under the supervision of a full-time faculty advisor on an applied engineering topic of interest. Near the end of the term, the student prepares a report of their findings and presents the study in an open departmental seminar. Both the seminar and the written report are used to determine the student's grade for BIOE 9995. The grade is determined jointly by the advisor and another designated grader selected by the Graduate Program Director.

Coursework Track:
Successful completion of coursework constitutes the culminating event.

Accelerated Programs

Undergraduate students may opt to pursue an accelerated +1 program, enabling them to complete both a bachelor's degree and master's degree in less time than the traditional route.

The accelerated pathway for the Bioengineering MSBioe is available to students pursuing the Bioengineering BSBioe.

Cohort Code: XMSBIOENG

Minimum Cumulative GPA: 3.00

Graduate Courses Approved to Count for Both Undergraduate and Graduate Degrees

Code	Title	Credit Hours
Four BIOE 5000+ courses, with advisor guidance [1]		12

[1] Additional electives include BIOL 5312, BIOL 5337, BIOL 5433, EPBI 5002, KINS 5202, MEE 5731, MEE 5732.

Suggested Academic Plan

Course	Title	Credit Hours
Year 3		
Spring		
One BIOE 5000+ course		3
	Credit Hours	**3**
Year 4		
Fall		
One BIOE 5000+ course		3
One BIOE 5000+ course		3
	Credit Hours	**6**
Spring		
One BIOE 5000+ course		3
	Credit Hours	**3**
	Total Credit Hours	**12**

Admissions Criteria

Candidates for the +1 program must:

- have a cumulative GPA of at least 3.00 by the end of the 5th semester.
- submit an application before the end of the 5th semester of study.
- submit the following:
  - recommendation letters from two faculty members and at least one must be from a faculty member in the relevant department; these letters can be submitted in a sealed envelope to Melissa Valdes or e-mailed directly to her at melissa.valdes@temple.edu.
  - personal statement.
  - resume.
- complete required coursework as outlined in the application.

Junior applicants must be able to complete their undergraduate degree in two years from admission into the +1 program. Senior applicants must be able to complete their undergraduate degree in one year from admission into the +1 program.

Application: https://engineering.temple.edu/admissions/undergraduate-admissions/1-bachelors-masters-accelerated-degree

Contact Information

Melissa Valdes, Assistant Dean for Undergraduate Studies
melissa.valdes@temple.edu

Learn more about the +1 program in Bioengineering MSBioe.

Contacts

Program Web Address:

https://www.temple.edu/academics/degree-programs/bioengineering-ms-en-bioe-msbe

Department Information:

Bioengineering Department
ATTN: BIO Programs, College of Engineering
1947 N. 12th Street
Philadelphia, PA 19122-6077
gradengr@temple.edu
215-204-7800

Submission Address for Application Materials:

https://apply.temple.edu/ENGINEERING/Account/Login

Department Contacts:

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