MASTERS OF BIOENGINEERING (MBE) DEGREE

Program Learning Outcomes for the MBE Degree

Program Learning Outcomes for the Applied Bioengineering Track

Upon completing the MBE degree, students pursuing the Applied Bioengineering track requirements will be able to:

1. Apply and integrate advanced knowledge of Bioengineering topics in at least one of the following areas: Biomaterials and Drug Delivery, Biomedical Imaging and Diagnostics, Computational and Theoretical Bioengineering, Tissue Engineering and Biomechanics, or Systems and Synthetic Biology.
2. Apply knowledge from engineering and other disciplines to identify, formulate, and solve novel and complex problems that require advanced knowledge in bioengineering.
3. Select and apply quantitative analytic techniques to analyze bioengineering data.
4. Gain admission to a graduate or professional program, if students want to pursue further education.

Program Learning Outcomes for the Global Medical Innovation Track

Upon completing the MBE degree, students pursuing the Global Medical Innovation track requirements will be able to:

1. Apply knowledge of Bioengineering topics in at least one of the following areas: Biomaterials and Drug Delivery, Biomedical Imaging and Diagnostics, Computational and Theoretical Bioengineering, Tissue Engineering and Biomechanics, or Systems and Synthetic Biology.
2. Develop effective medical products, from concept to commercialization, within a team environment.
3. Comprehend and navigate the global medical technology industry by leveraging an internship experience.
4. Gain employment or advance professionally in a technical field related to bioengineering.

Requirements for the MBE Degree

The MBE degree is a non-thesis master’s degree. For general university requirements, please see Non-Thesis Master's Degrees (ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-non-thesis-masters-degrees).

- A minimum of 30 credit hours to satisfy major requirements.
- A minimum grade of a B- (2.67 grade points) for all required courses applied toward the MBE degree requirements.
- One track as listed below.

The Master of Bioengineering degree is intended for those having a BA or BS degree in an engineering or science discipline.

There are two Areas of Specialization, or tracks, in the Master of Bioengineering program:

- Applied Bioengineering: designed as a flexible degree for students who will pursue careers in research, medicine, or related fields.
- Global Medical Innovation: designed specifically for students who will pursue a career in the global medical technology industry. As the medical technology industry becomes increasingly global with an emphasis in cost-effective health care solutions and clinical outcomes, Rice University seeks to prepare engineers for this new and changing environment. This track of the MBE degree is designed to prepare engineers for careers in medical technology through education in innovation, emerging-market design projects and internships. The Rice MBE track in Global Medical Innovation program specifically targets students who have an undergraduate degree in engineering (mechanical, electrical, chemical, or bioengineering/medical) or a related field, and who are interested in pursuing a career in the private, public, or non-profit sectors of medical technology.

Both tracks have the same prerequisites, though applicants will be evaluated considering the different purposes of each track. More information about each of these tracks can be found below. Curriculum must be approved by the Graduate Academic Affairs Committee and the Bioengineering Department. This is done on a case-by-case basis.

Summary

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Total Credit Hours Required for the Master of Bioengineering (MBE) Degree</td>
<td>30</td>
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</tbody>
</table>

Requirements for the Applied Bioengineering Track

Students pursuing the Applied Bioengineering track must complete:

- A minimum of 18 credit hours from departmental course offerings (BIOE) at the 500-level or above.
- A minimum of 3 credit hours of graduate level professional development electives chosen from a specific list of approved courses (see below for list).
- A minimum of 3 credit hours courses taken as electives at the 500-level or above.
- BIOE 539 or an alternative quantitative-based BIOE course at the 400-level or above may count toward this requirement.
- BIOE 627 Medical Technology Design Seminar I and BIOE 628 Medical Technology Design Seminar II.
- A minimum overall GPA of 3.0 in required coursework.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOE 627</td>
<td>MEDICAL TECHNOLOGY DESIGN SEMINAR I</td>
<td>1.5</td>
</tr>
<tr>
<td>BIOE 628</td>
<td>MEDICAL TECHNOLOGY DESIGN SEMINAR II</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>Students must complete 6 courses from departmental course offerings (BIOE) at the 500-level or above.</td>
<td>18</td>
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</table>

Elective Requirements

Professional Development Electives

Select a minimum of 3 credit hours from the following:

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Select a minimum of 3 credit hours from the following.</td>
<td>3</td>
</tr>
</tbody>
</table>
BIOE 633  LIFE SCIENCE ENTREPRENEURSHIP AND THE ROLES OF FOUNDERS AND VENTURE CAPITAL ON HIGH TECH STARTUP
ENGI 510  TECHNICAL AND MANAGERIAL COMMUNICATIONS
ENGI 515  LEADING TEAMS AND INNOVATION
ENGI 529  ETHICS AND ENGINEERING LEADERSHIP
ENGI 542  COMMUNICATION FOR ENGINEERS: BUILDING A PRACTICAL TOOLBOX
ENGI 610  MANAGEMENT FOR SCIENCE AND ENGINEERING
ENGI 615  LEADERSHIP COACHING FOR ENGINEERS
ENGI 545 / CEVE 529  ETHICS AND ENGINEERING LEADERSHIP
ENGI 542  COMMUNICATION FOR ENGINEERS: BUILDING A PRACTICAL TOOLBOX
ENGI 610  MANAGEMENT FOR SCIENCE AND ENGINEERING
ENGI 615  LEADERSHIP COACHING FOR ENGINEERS
ENGI 545 / LEAD 545  STRATEGIC THINKING FOR COMPLEX PROBLEM SOLVING
MGMT 734  TECHNOLOGY ENTREPRENEURSHIP

MATH Elective Requirement
BIOE 539  APPLIED STATISTICS FOR BIOENGINEERING AND BIOTECHNOLOGY 2

BIOE Elective
Select one course from departmental course offerings (BIOE) at the 500-level or above. 3

Total Credit Hours 30

Footnotes and Additional Information
1 Additional course offerings may be completed with advisor approval.
2 BIOE 539 or an alternative quantitative-based BIOE course, taken at the 400-level or above.
3 Students may complete a course offered by another department, but it must be relevant to the MBE degree.

Requirements for the Global Medical Innovation Track
Students pursuing the Global Medical Innovation track must complete:

- A minimum of 30 credit hours as listed below.
- A minimum overall GPA of 3.2 in required coursework.

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>BIOE 527</td>
<td>MEDICAL TECHNOLOGY DESIGN 1</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 529</td>
<td>MEDICAL TECHNOLOGY DESIGN 2</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 528</td>
<td>MEDICAL TECHNOLOGY IMPLEMENTATION 1</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 530</td>
<td>MEDICAL TECHNOLOGY IMPLEMENTATION 2</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 627</td>
<td>MEDICAL TECHNOLOGY DESIGN SEMINAR 1</td>
<td>1.5</td>
</tr>
<tr>
<td>BIOE 628</td>
<td>MEDICAL TECHNOLOGY DESIGN SEMINAR 2</td>
<td>1.5</td>
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</tbody>
</table>

Internship or Independent Study
Select 1 of the following: 1

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>BIOE 600</td>
<td>GRADUATE BIOENGINEERING INDUSTRY INTERNSHIP (completed during the summer)</td>
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<tr>
<td>BIOE 506</td>
<td>GRADUATE INDEPENDENT STUDY (completed during the fall and spring semesters)</td>
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Elective Requirements
Select 3 courses as electives as listed below:

Professional Development Electives
Select 1 from the following: 3

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<tr>
<td>BIOE 539 / MGMT 633</td>
<td>LIFE SCIENCE ENTREPRENEURSHIP AND THE ROLES OF FOUNDERS AND VENTURE CAPITAL ON HIGH TECH STARTUP</td>
<td></td>
</tr>
<tr>
<td>ENGI 510</td>
<td>TECHNICAL AND MANAGERIAL COMMUNICATIONS</td>
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<td>ENGI 515</td>
<td>LEADING TEAMS AND INNOVATION</td>
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<td>STRATEGIC THINKING FOR COMPLEX PROBLEM SOLVING</td>
<td></td>
</tr>
<tr>
<td>MGMT 734</td>
<td>TECHNOLOGY ENTREPRENEURSHIP</td>
<td></td>
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</table>

MATH Elective
BIOE 539  APPLIED STATISTICS FOR BIOENGINEERING AND BIOTECHNOLOGY 2

BIOE Elective
Select 1 course from departmental course offering (BIOE) at the 500-level or above.

Total Credit Hours 30

Footnotes and Additional Information
1 This will be considered on a case-by-case basis, and the student is responsible for obtaining and selecting an internship that best aligns with their career goals.
2 BIOE 539 or an alternative quantitative-based BIOE course, taken at the 400-level or above, with the advisor’s approval.

Policies for the MBE Degree
Department of Bioengineering Graduate Program Handbook
The General Announcements (GA) is the official Rice curriculum. As an additional resource for students, the department of Bioengineering publishes a graduate program handbook, which can be found here: http://gradhandbooks.rice.edu/2017_18/Bioengineering_Graduate_Handbook.pdf

Enrollment Status Requirements
Students may enroll for the Applied Bioengineering track on a full-time or part-time basis. Students may only enroll on a full-time basis for the Global Medical Innovation track. University graduation requirements (including the minimum residency requirement for students in graduate degree programs) still apply.
Transfer Credit
For Rice University's policy regarding transfer credit, see Transfer Credit (ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-non-thesis-masters-degrees). Some departments and programs have additional restrictions on transfer credit. Students are encouraged to meet with their academic program's advisor when considering transfer credit possibilities.

For additional information, please see the Bioengineering website: http://bioengineering.rice.edu/

Opportunities for the MBE Degree
For additional information, please see the Bioengineering website: http://bioengineering.rice.edu/