Bioengineering Interdepartmental Graduate (BIG) Program

Assessment Plan for the PhD Program

Program Learning Outcomes

Upon graduation with a PhD in Bioengineering, students will:

1. possess (a) sufficient knowledge and experience to synthesize biological and engineering concepts, (b) graduate-level familiarity with at least 3 of the following areas, and (c) mastery in a sub-discipline related to at least 1 of the following areas of bioengineering:
   • Biomaterials and Regenerative Medicine
   • Biomedical Imaging
   • Computational Bioengineering
   • Molecular and Cellular Engineering
   • Neuroengineering

2. have the ability to conduct independent bioengineering research, including (a) being able to identify problems; (b) formulate a research plan; (c) gain sufficient expertise to carry out that plan; and (d) analyze and interpret results.

3. have the ability to effectively disseminate research results and communicate bioengineering concepts through (a) written and (b) oral means.

4. be able to effectively teach bioengineering concepts at an undergraduate level.

5. gain professional development as related to bioengineering, including but not limited to ethical considerations, delivery of technical presentations, preparation of grant/fellowship applications, and peer-reviewed technical manuscripts.

Curriculum Map

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L - introductory, D - developed, M - mastery
Assessment

PLO 1 (coursework in bioengineering)
• Direct evidence
  o Grades in courses indicated in curriculum map
  o Faculty evaluation of bioengineering knowledge on Written Qualifying Exams
  o Committee evaluation of bioengineering knowledge on Oral Qualifying Exams
  o Committee evaluation of bioengineering knowledge on annual Research Progress Evaluations
  o Faculty evaluation of bioengineering knowledge on Dissertation Defense
• Indirect evidence
  o Exit surveys of alumni
  o Advisory board evaluation
• Year to be assessed
  o Evaluated every 3 years by faculty (AY 2019-20)
• Participants
  o Students, faculty, alumni, advisory board
• Process
  o Continuous collection of direct evidence
  o Annual solicitation of surveys
  o Graduate advisory committee examination of collected information before presentation to faculty in preparation for advisory board meetings
• Targets
  o Students able to demonstrate familiarity with bioengineering knowledge in general and mastery of bioengineering related to dissertation research

PLO 2 (research)
• Direct evidence
  o Committee evaluation of research ability on Oral Qualifying Exams
  o Committee evaluation of research ability in annual Research Progress Evaluation meetings
  o Department evaluation of colloquium presentations
  o Department and committee evaluation of research results and independence on Dissertation Defense
• Indirect evidence
  o Exit and follow-up surveys of alumni
  o Advisory board evaluation
• Year to be assessed
  o Evaluated every 3 years by faculty (AY 2017-18)
• Participants
  o Students, faculty, alumni
• Process
  o Continuous collection of direct evidence
  o Annual collection of exit and follow-up surveys of alumni
Graduate advisory committee review

Targets

- Development of students capable of conducting independent research

**PLO 3 (communication)**

- Direct evidence
  - Grades in courses listed in program of study
  - Faculty evaluation of student performance on Written Qualifying Exams
  - Committee evaluation of student performance on Oral Qualifying Exams
  - Faculty evaluation of student presentation in colloquium
  - Committee evaluation of student performance on annual Research Progress Evaluations
  - Department and committee evaluation of student performance on Dissertation Defense

- Indirect evidence
  - Exit surveys of alumni

- Year to be assessed
  - Continuous collection of direct evidence, annual collection of indirect evidence
  - Evaluated every 3 years by faculty (AY 2017-18)

- Participants
  - Students, faculty, alumni

- Process
  - Continuous collection of direct evidence
  - Annual collection of exit surveys
  - Evaluation once every 3 years by graduate advisory committee before discussion by department faculty

- Targets
  - Development of students capable of clear and effective communication in both written and oral formats

**PLO 4 (teaching)**

- Direct evidence
  - Instructor evaluation of student performance as TA
  - TA evaluations

- Indirect evidence
  - Exit surveys of alumni

- Year to be assessed
  - Continuous collection of direct evidence, annual collection of indirect evidence
  - Evaluated every 3 years by faculty (AY 2018-19)

- Participants
  - Graduate advising committee, graduate student TAs, instructors of related courses

- Process
○ Graduate advising committee will collect instructor evaluations and iEval results shortly following the end of every academic quarter
○ Graduate advising committee will discuss any cases of TA evaluations below acceptable standards
○ Graduate advising committee will discuss TA evaluations annually
○ Assessment of PLO once every 3 years
• Targets
  ○ Continued improvement of students in TA positions during the course of a quarter
  ○ Effective teaching by graduate students TA to undergraduates

**PLO 5 (professional development)**
• Direct evidence
  ○ Instructor evaluation and grades in courses indicated in curriculum map
  ○ Faculty evaluation of student presentation in colloquium
  ○ Faculty evaluation of annual Research Progress Evaluations, which include information on fellowship applications, authorship on peer-reviewed publications, participation in conferences
• Indirect evidence
  ○ Exit and follow-up surveys of alumni
  ○ Surveys of employers of alumni
• Year to be assessed
  ○ Evaluated every 3 years by faculty (AY 2019-20)
• Participants
  ○ Students, faculty, alumni and their employers
• Process
  ○ Continuous collection of direct evidence
  ○ Annual collection of indirect evidence
  ○ Discussion of courses with instructors of relevant courses
  ○ Graduate advising committee evaluation of collected results every 3 years to discuss revising of relevant curriculum
• Targets
  ○ Development of students with sufficient professional development for successful employment following graduation
Assessment Plan for the MS Program
(Plan I: Thesis Option)

Program learning outcomes

Upon graduation with a PhD in Bioengineering, students will:

1. possess (a) sufficient knowledge and experience to synthesize biological and engineering concepts, (b) graduate-level familiarity with at least 3 of the following areas:
   - Biomaterials and Regenerative Medicine
   - Biomedical Imaging
   - Computational Bioengineering
   - Molecular and Cellular Engineering
   - Neuroengineering

2. have the ability to conduct independent bioengineering research, including (a) formulate a research plan; (b) gain sufficient expertise to carry out that plan; and (c) analyze and interpret results.

3. have the ability to effectively disseminate research results and communicate bioengineering concepts through (a) written and (b) oral means.

4. gain professional development as related to bioengineering, including but not limited to ethical considerations, delivery of technical presentations, preparation of grant/fellowship applications, and peer-reviewed technical manuscripts.

Curriculum map
Assessment

**PLO 1 (coursework in bioengineering)**

- **Direct evidence**
  - Grades in courses indicated in curriculum map
  - Committee evaluation of bioengineering knowledge on annual Research Progress Evaluations
  - Faculty evaluation of bioengineering knowledge on Thesis Defense
- **Indirect evidence**
  - Exit surveys of alumni
  - Advisory board evaluation
- **Year to be assessed**
  - Evaluated every 3 years by faculty (AY 2019-20)
- **Participants**
  - Students, faculty, alumni, advisory board
- **Process**
  - Continuous collection of direct evidence
  - Annual solicitation of surveys
  - Graduate advisory committee examination of collected information before presentation to faculty in preparation for advisory board meetings
- **Targets**
  - Students able to demonstrate familiarity with bioengineering knowledge in general and mastery of bioengineering related to dissertation research

**PLO 2 (research)**

- **Direct evidence**
  - Committee evaluation of research ability in annual Research Progress Evaluation meetings
  - Department evaluation of colloquium presentations
  - Department and committee evaluation of research results on Thesis Defense
- **Indirect evidence**
  - Exit and follow-up surveys of alumni
  - Advisory board evaluation
- **Year to be assessed**
  - Evaluated every 3 years by faculty (AY 2017-18)
- **Participants**
  - Students, faculty, alumni
- **Process**
  - Continuous collection of direct evidence
  - Annual collection of exit and follow-up surveys of alumni
  - Graduate advisory committee review
- **Targets**
  - Development of students capable of conducting research
PLO 3 (communication)

- Direct evidence
  - Grades in courses listed in program of study
  - Committee evaluation of student performance on annual Research Progress Evaluations
  - Department and faculty evaluation of student performance on Thesis Defense
- Indirect evidence
  - Exit surveys of alumni

- Year to be assessed
  - Continuous collection of direct evidence, annual collection of indirect evidence
  - Evaluated every 3 years by faculty (AY 2017-18)

- Participants
  - Students, faculty, alumni

- Process
  - Continuous collection of direct evidence
  - Annual collection of exit surveys
  - Evaluation once every 3 years by graduate advisory committee before discussion by department faculty

- Targets
  - Development of students capable of clear and effective communication in both written and oral formats

PLO 4 (professional development)

- Direct evidence
  - Instructor evaluation and grades in courses indicated in curriculum map

- Indirect evidence
  - Exit and follow-up surveys of alumni
  - Surveys of employers of alumni

- Year to be assessed
  - Evaluated every 3 years by faculty (AY 2019-20)

- Participants
  - Students, faculty, alumni and their employers

- Process
  - Continuous collection of direct evidence
  - Annual collection of indirect evidence
  - Discussion of courses with instructors of relevant courses
  - Graduate advising committee evaluation of collected results every 3 years to discuss revising of relevant curriculum

- Targets
  - Development of students with sufficient professional development for successful employment following graduation
Assessment Plan for the MS Program  
(Plan II: Comprehensive Exam)

Program learning outcomes

Upon graduation with a PhD in Bioengineering, students will:

1. possess (a) sufficient knowledge and experience to synthesize biological and engineering concepts, (b) graduate-level familiarity with at least 3 of the following areas.
   - Biomaterials and Regenerative Medicine
   - Biomedical Imaging
   - Computational Bioengineering
   - Molecular and Cellular Engineering
   - Neuroengineering

2. have the ability to effectively communicate bioengineering concepts through (a) written and (b) oral means.

3. gain professional development as related to bioengineering, including but not limited to ethical considerations, delivery of technical presentations, preparation of peer-reviewed technical manuscripts.

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I - introductory, D - developed, M - mastery
Assessment

**PLO 1 (coursework in bioengineering)**
- Direct evidence
  - Grades in courses indicated in curriculum map
  - Faculty evaluation of bioengineering knowledge on Comprehensive Exams
- Indirect evidence
  - Exit surveys of alumni
  - Advisory board evaluation
- Year to be assessed
  - Evaluated every 3 years by faculty (AY 2019-20)
- Participants
  - Students, faculty, alumni, advisory board
- Process
  - Continuous collection of direct evidence
  - Annual solicitation of surveys
  - Graduate advisory committee examination of collected information before presentation to faculty in preparation for advisory board meetings
- Targets
  - Students able to demonstrate familiarity with bioengineering knowledge in general

**PLO 2 (communication)**
- Direct evidence
  - Grades in courses listed in program of study
- Indirect evidence
  - Exit surveys of alumni
- Year to be assessed
  - Continuous collection of direct evidence, annual collection of indirect evidence
  - Evaluated every 3 years by faculty (AY 2017-18)
- Participants
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- Process
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  - Evaluation once every 3 years by graduate advisory committee before discussion by department faculty
- Targets
  - Development of students capable of clear and effective communication in both written and oral formats

**PLO 3 (professional development)**
- Direct evidence
  - Instructor evaluation and grades in courses indicated in curriculum map
- Indirect evidence
- Exit and follow-up surveys of alumni
- Surveys of employers of alumni

- Year to be assessed
  - Evaluated every 3 years by faculty (AY 2019-20)

- Participants
  - Students, faculty, alumni and their employers

- Process
  - Continuous collection of direct evidence
  - Annual collection of indirect evidence
  - Discussion of courses with instructors of relevant courses
  - Graduate advising committee evaluation of collected results every 3 years to discuss revising of relevant curriculum

- Targets
  - Development of students with sufficient professional development for successful employment following graduation