ACADEMIC YEAR 2021-2022 / ANNUAL PROGRAM REVIEW (APR)

# Biological Engineering M.S.

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**Template:**

Student Learning Assessment Report (add one "plan item" for each major, degree, and/or certificate offered by dept)

**Name of degree/major or credential (example: Psychology BA/BS):**

Biological Engineering M.S.

**Assessment Cycle State Date:**

3/1/2021

**Assessment Cycle End Date:**

7/1/2022

**Progress:**

Under Review by College/Institution

**Providing Department:**

Chemical & Biological Engineering

**Responsible Users:**

**Assessment Report Contact:**

Dev Shrestha

**Program Changes in Past Year:**

No change to the program other than the departmental merger of Chemical and Biological Engineering.

**Learning Outcomes are Communicated to All Students in Program (check box if true):**

true

**Learning Outcomes are Communicated to All Faculty (check box if true):**

true

**Optional: Framework Alignment:**

**Import Outcomes Data (from Anthology Outcomes):**

The graduate requirements for Biological Engineering are described in the graduate program handbook. The graduate program assumes that the students are already well-grounded in the fundamentals of Biological Engineering from their undergraduate education. The learning outcome for M.S. program in Biological Engineering are:

1. Knowledge Base: An in-depth knowledge of the degree subject matter, integrating and building upon the foundation provided by a relevant undergraduate degree.
2. Original Research / Design: An ability to conduct original research and to appropriately and accurately analyze experimental data with insightful discussion.
3. Communication Skills: An ability to communicate findings in an appropriate format for disciplinary, interdisciplinary, and lay audiences, both orally and in writing.
4. Global Citizenship: An understanding impact of this project or research specifically, and of the responsibility to enhance the quality of life of the global community through the practice of engineering.

In order to meet the learning objectives, the students are required to meet the following requirements:

All M.S. students are expected to carry out a research program as part of their education.  No qualifying examination is required for M.S. students.

Major Professor and Committee

During the first semester, the student will work with his/her major professor to select a program of study committee.  Normally, the major professor will be the person in charge of the research in which the student is interested.  The major professor is the student's point of contact with the department when questions arise about anything connected with their study or research.

The program of study committee (or the Graduate Committee) consists of faculty members that can help the student prepare a plan for coursework and research. For the M.S. degree, the committee will normally consist of three persons including the major professor, but may have up to five. In addition to the major professor, the committee should include one other faculty member from the department and one from outside the department. For the purpose of this requirement, BE affiliate faculty members are considered in the department.

### Study Plan

Preferably in the first semester but no later in the end of the second semester, the student has to develop a study plan consisting of coursework to be approved by the student's graduate committee. This study plan may include courses the committee or departmental graduate faculty regards as deficiencies. Examples are courses which are required for an undergraduate degree at UI but have not previously been taken by the student. The credits of these deficiencies do not count toward the degree requirements. Generally, the study plan includes courses related to the thesis project, and courses that fulfill the student's professional objectives.

The M.S. degree requires a minimum of 30 credits in courses numbered 300 and above of which at least 21 credits must be in courses other than BE 500 Master's Research and Thesis. At least 18 credits must be numbered 500 or above (including BE 500), and at least 6 credits must be 500 level BE courses excluding BE 500. BE courses that are required in the BE undergraduate curriculum cannot be used as part of the 30 credits required for the M.S. degree.

A typical program will consist of at least 9 credits of BE 500 and at least 21 credits of coursework other than BE 500. These totals will not include courses taken to correct deficiencies.

An overall GPA of 3.0 or above is required for graduation.

Twelve credits per semester is the maximum allowed for students on an assistantship.

### Final Examination

An oral examination (or thesis defense) is required for all M.S. students. The purpose of the final examination is to determine if the student can demonstrate mastery of a subject in depth and demonstrate that the research program was properly carried out and sound conclusions were drawn from the results.

During the semester in which the requirements for the degree (both coursework and research) are expected to be completed, an oral examination will be requested by the student according to the guidelines of College of Graduate Studies and conducted by the student's graduate committee. In this examination, normally two to three hours in length, the student will be required to defend his/her thesis as well as answer questions on related coursework.

The format for the final examination includes that the student prepares a brief presentation (20-30 minutes in length) summarizing his/her research project. This presentation is open to the public and the student is expected to take questions from the audience during or at the end of the presentation. After the presentation, the public will be asked to leave so that the committee continues to question the student privately.

The committee may 1) pass the student with or without special conditions being attached, 2) require a re-examination at a later date, or 3) deny the degree. Appeal of a denial will follow current University of Idaho policies. Consult the College of Graduate Studies (www.uidaho.edu/cogs/) and/or the Dean of Students (uidaho.edu/student-affairs/dean-of-students) for academic appealing procedures in details.

### Student Outcome Evaluation

The compiled scores for recent graduate showed the following statistics.

| Program Learning Outcome | Average Score* | St.Dev |
|---|---|---|
| Knowledge Base: | 3.5 | 0.5 |
| Original Research / Design: | 3.8 | 0.5 |
| Communication Skills: | 3.5 | 0.5 |
| Global Citizenship: | 3.5 | 0.5 |

* Score is described below

The students are scored from 1 to 4 points the interpretation of score is shown in the table below

| BE Student Learning Outcome | Assessment Rubric | | | |
|---|---|---|---|---|
| | Exceeds requirements Score:4 | Meets Requirements Score:3 | Partially Meets requirements Score:2 | Does Not Meet requirements Score:1 |

| | | | | |
|---|---|---|---|---|
| **1. Knowledge Base**<br>An in-depth knowledge of the degree subject matter, integrating and building upon the foundation provided by a relevant undergraduate degree. | Demonstrated a thorough knowledge of both breadth and depth of knowledge in discipline. Showed high level of competence in research area. | Demonstrated both breadth and depth of knowledge in discipline. Was competent in research area. | Demonstrated adequate depth in research area, but lacked breadth in discipline. | Did not demonstrate depth in research area. |
| **2. Original Research / Design**<br>An ability to conduct original research and to appropriately and accurately analyze experimental data with insightful discussion. | Demonstrated extensive knowledge of published work in area of research and the ability to build on that knowledge. Showed ability to plan and execute original research and to analyze and correctly interpret the results. | Demonstrated adequate knowledge of published work in area of research and ability to build on that knowledge. Showed ability to execute original research and to analyze and correctly interpret the results. | Literature research was weak. Was able to conduct research and analyze and interpret the results under supervision. | Obviously missed many of the important works in the field. Research techniques and analysis weak. |
| **3. Communication Skills**<br>An ability to communicate findings in an appropriate format for disciplinary, interdisciplinary, and lay audiences, both orally and in writing. | Thesis was well written using correct, clear and concise English with consistent format. Oral presentation showed good command of language and subject matter. Responses to questions were direct and provide the desired clarification. Excellent use of graphics. | Thesis was well written. Sentence structure and format generally resulted in “easy reading”. Oral presentation was clear and concise. Responses to questions were generally concise and to the point. Graphics were appropriate. | Parts of the thesis were poorly written and/or format was inconsistent. Oral presentation was sometimes hard to follow and responses to questions did not always clarify the point. | Report was poorly written with and difficult to read. Inconsistent format. Poor oral presentation. |
| **4. Global Citizenship**<br>An understanding impact of this project or research specifically, and of the responsibility to enhance the quality of life of the global community through the practice of engineering. | Provided a thoughtful analysis of the potential impact of the research, both intended (positive) and unintended (positive or negative), on society. Knew and understood issues involving ethics, sustainability and public health and safety related to research subject. | Provided a sound analysis of the potential impact of the research on society. Was knowledgeable of issues involving ethics, sustainability and public health and safety related to research subject. | Provided a weak analysis of the potential impact of the research on society or was not able to define ethical, sustainability or public health and safety issues. | Was not able to give a cogent analysis of societal context issues. |

The data shows that the students met the requirements in each of the categories. There was no score reported below 3.0 in any category.

### Summary of Student Learning:

- The M.S. program in Biological Engineering has well-defined learning objectives that are measured during the final defense.
- The average score for all three learning objectives was right around 'Meet Requirements' with no statistically significant difference.

Attached Files
There are no attachments.

### Summary of Faculty Discussion:

The Chemical and Biological Engineering faculty reviewed and discussed the learning outcomes for this program, both offline and during faculty meetings. The faculty approved the student outcomes and the way they are being evaluated.

Attached Files
There are no attachments.

### Summary of Changes/Improvements Being Considered:

The faculty will discuss how to assess inter-rater reliability for Biological Engineering M.S. in future meetings.

Attached Files
There are no attachments.

### Inter-rater Reliability:

The program currently does not have inter-rater reliability assessment program.

### Closing the Loop:

Not applicable for first year APR

Attached Files
There are no attachments.

### Quality Assessment Feedback:

Attached Files
There are no attachments.

### Related Items

*No connections made*