

Preliminary Annual Academic Assessment Report, AY 2023-2024

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Bachelor of Science in Biological Engineering (BSBE)

Student Learning Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Assessment and Evaluation: AY 2023-2024

The faculty of the Department of Biological & Agricultural Engineering evaluated Student Outcomes assessment data via email and shared directories in May 2024, in anticipation of its annual faculty retreat, to be held August 13-14, 2024. These outcomes assessments and course self-review materials are in hand. Our continuous quality improvement plan requires assessment of half of the student outcomes each year (which included Outcomes (3), (4), and (6) in 2023-2024). The results of the analysis include the following:

- **Outcome 3:**
 - Evaluated in BENG 4933 and in the senior design course 4823, generally strong communication skills were seen, meeting expectations for the rubric and demonstrating clear and effective communication.
- **Outcome 4:**
 - Evaluated in BENG 2632, 4812, 4663, outcomes in ethical and professional judgment were met. Some students in 2632 needed better documentation of their process or to consider broader impacts of their work. By the senior classes, students showed significant improvements and development in judgment and consideration of broader societal, economic, and environmental consequences of their design work.
- **Outcome 6:**
 - Evaluated in BENG 3663 (methods 2) and BENG 3113 (Measurements and Controls), students met outcomes in the development and interpretation of experimentation. Additional improvements in documentation and interpretation of data and results are always available to students, and the faculty will work to stress this need further.

Changes made to courses or instructional facilities following previous report:

1. The department computer-lab/instruction room will replace standing virtual machines with docking stations for student laptops
2. Our Professionalism course is open to those with Junior standing
3. The instructor of 3663 (methods 2) will work to improve the way that statistics are taught.
4. The instructor of 3723 (unit operations) will work to improve the way that studying for an exam is taught and encouraged.
5. The instructors of 4823 (senior design II) will work to improve earlier drafting of work, clearer assignment requirements and due dates, and coordination among instructors (for co-taught sessions).
6. The instructor of 4933 (watershed engineering) will work to improve and focus the course content and consider creative new assignments, perhaps changing the focus from modeling with the EPA SWMM software.

Additional data collection and anticipated changes to the degree program:

As part of our commitment to continuous improvement, we also received helpful feedback from our **external advisory board**, in a meeting held May 2, 2024. This meeting helped provide input, including to remove the explicit requirement of BIOL 2103/2011L (microbiology and lab) And to replace it with a wider list of biology electives.

There was interest in extending instruction in professional development and teamwork skills, in changing the title of BENG 3653 from Global Bioenergy to Renewable Energy Engineering. We also had minor feedback to the Program Educational Objectives. We will discuss these questions in more detail in the August 2024 retreat.

The department will continue to monitor direct measurements from course materials, attend to other lines of evidence such as FE exam results, senior design team questionnaires, exit surveys, and feedback from alumni and stakeholder groups.