Annual Academic Assessment Report

Bachelor of Science in Biomedical Engineering (BMEGBS)

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 2024-2025

The faculty of the Department of Biomedical Engineering evaluated Student Learning Outcome assessment data at two faculty meetings, held in January 2025 (for Fall 2024 courses) and May 2025 (to discuss Spring 2025 courses). The results of the analysis include the following:

- **Outcome 1**:
  - Problem solving skills exhibited on exam/homework problems in the Biomechanics (BMEG 28103), Biomedical Systems and Signals (BMEG 31204), Biomedical Modeling and Numerical Methods (BMEG 36503) and Biomedical Transport (BMEG 46203) courses indicate students are achieving the Outcome at the desired level.

- **Outcome 2**:
  - Engineering design skills exhibited in the Clinical Observations and Needs Finding courses (BMEG 38001, Fall / Spring versions) and Capstone Design

experience (BMEG 48103) indicate students are achieving the Outcome at the desired target level.

- **Outcome 3:**
  - o Communication skills exhibited in the Biomolecular Engineering (BMEG 38204) and Capstone Design experience (BMEG 48203) indicate students are achieving the Outcome at the desired target level.

- **Outcome 4:**
  - o Recognizing ethical and professional responsibilities to make informed judgments exhibited in the Introduction to Biomedical Engineering (BMEG 26104, Fall / Spring versions), Biomolecular Engineering (BMEG 38204), and Clinical Observations and Needs Finding (BMEG 38001, Fall / Spring versions) courses indicate the students are achieving the Outcome at the desired target level.

- **Outcome 5:**
  - o Teamwork and leadership exhibited in the Biomaterials (BMEG 36304), Capstone Design (BMEG 48203) courses indicate students are achieving the Outcome at the desired target level.

- **Outcome 6:**
  - o Conducting experiments, analyzing data, and drawing conclusions exhibited in the Biomaterials (BMEG 36304) laboratory courses indicate the students are achieving the Outcome at the desired target level.
  - o The Biomedical Instrumentation (BMEG 29004) course did not achieve the desired target level by a narrow margin; will continue to monitor.

- **Outcome 7:**
  - o Obtaining and applying new knowledge exhibited in the Introduction to Biomedical Engineering (BMEG 26104, Spring version) and Capstone Design (BMEG 48103) courses indicates students are achieving the Outcome at the desired target level.
  - o The Fall version of the Introduction to Biomedical Engineering (BMEG 26104) course indicated students did NOT achieve the Outcome at the desired target level. This is likely due to the small sample size (8 students); when combined with the Fall version of the course, the Outcome target was met.

Changes to the Degree Program – Planned or Considered

- The Department is planning to deploy a 2-credit, Fall semester Sophomore-year course focused on Biomedical Engineering programming tools, including SolidWorks and Python programming, beginning Fall 2025. The BMEG 26104 course will be subsequently modified to a 2 credit, survey-type course

Changes to the Assessment Process – Planned or Completed

- The Department modified course prerequisites as part of the BMEGBS program in order to provide enhanced flexibility for students in AY 2023-2024 and beyond. Comparisons between exam courses and Outcome assessments before and after this change have shown negligible changes in overall student performance. We will continue to monitor these changes and whether there is a need to further modify these in the future.

- The Biomedical Modeling and Numerical Methods (BMEG 36503) course was substantially modified in AY 2024-2025 with a rigorous semester-long project featuring substantial Python or SolidWorks programming. Course assessments for Outcome 1 were favorable.