1. Knowledge of Mathematics - Graduates will be able to apply knowledge of mathematics including differential equations and statistics, physical and life sciences, and engineering to carry out analysis and design to solve problems at the interface of engineering and biology.
   1. Rubric - Assessment #1

Direct Measures: The Senior Design External Evaluation form is filled out for each senior design team by outside evaluators chosen from local industry and other academic institutions. A similar taxonomy is used for this form as was used for the Senior Design Faculty Evaluation ranging from Poor to Excellent with the same 5-point grading scale.

Scale used (see attached for scale description):

(4) Excellent

(3) Very Good

(2) Good

(1) Fair

(0) Poor

* + 1. Results –
       1. Senior Design External Assessment – Avg Score XX;  
          XX teams scored 2.5 or above (N=XX)
       2. Senior Design Faculty Assessment (Outcome A) - Avg Score 3.71;   
          71 students scored 2.5 or above (N=71)

# of Students Reported for Each

Excellent (52)

Very Good (17)

Good (5)

Fair (3)

Poor (0)

* + - 1. Analysis:
  1. Rubric - Assessment #2

Direct Measure: Laboratory Evaluation Forms assess student performance based on specific criteria which are filled out by the Laboratory Instructor at the end of the course. The evaluation sheet contains a list of core competencies important to the program and a series of questions relating to each of these core competencies. Each question is weighted with respect to how important it is to the particular student learning outcome and is scored using the following taxonomy. The taxonomy for this evaluation ranges from Poor to Excellent where Poor corresponds to 0 and Excellent corresponds to 4.

Scale used (see attached for scale description):

(4) Excellent

(3) Very Good

(2) Good

(1) Fair

(0) Poor

* + 1. Results –
       1. BME Lab Evaluation - Avg Score 3.50; 143 students scored 2.5 or above (N=168)
       2. Analysis:

1. Critical Thinking - Graduates will be able to design a system, component, or process to meet desired needs, including systems that involve the interaction between living and non-living materials, within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
   1. Rubric - Assessment #1

Direct Measures: Senior Design assessments include the Senior Design Faculty Evaluation form and the Senior Design External Evaluation Form. The Senior Design Faculty Assessment is filled out by the Senior Design Faculty member responsible for mentoring the team and is filled out for each member in the team. Each student is assessed by the faculty member with regards to a number of specific questions which are directly related to critical thinking.

The Senior Design External Evaluation form is filled out for each senior design team by outside evaluators chosen from local industry and other academic institutions. A similar taxonomy is used for this form as was used for the Senior Design Faculty Evaluation ranging from Poor to Excellent with the same 5-point grading scale.

Scale used (see attached for scale description):

(4) Excellent

(3) Very Good

(2) Good

(1) Fair

(0) Poor

* + 1. Results –
       1. Senior Design External Assessment – Avg Score XX;  
          XX teams scored 2.5 or above (N=XX)
       2. Senior Design Faculty Assessment (Outcome B) - Avg Score 3.69;   
          69 students scored 2.5 or above (N=80)

# of Students Reported for Each

Excellent (59)

Very Good (9)

Good (3)

Fair (2)

Poor (0)

* + - 1. Analysis:
  1. Rubric - Assessment #2

Direct Measure: Laboratory Evaluation Forms assess student performance based on specific criteria which are filled out by the Laboratory Instructor at the end of the course. The evaluation sheet contains a list of core competencies important to the program and a series of questions relating to each of these core competencies. Each question is weighted with respect to how important it is to the particular student learning outcome and is scored using the following taxonomy. The taxonomy for this evaluation ranges from Poor to Excellent where Poor corresponds to 0 and Excellent corresponds to 4.

Scale used (see attached for scale description):

(4) Excellent

(3) Very Good

(2) Good

(1) Fair

(0) Poor

* + 1. Results –
       1. BME Lab Evaluation - Avg Score 3.50; 143 students scored 2.5 or above (N=168)
       2. Analysis:

1. Communicate Effectively in BME - Written - Graduates will be able to communicate effectively through written assignments/reports (scientific writing) in the field of Biomedical Engineering.
   1. Rubric -

Graduates are assessed on their ability to convey a deep understanding of the experimental process and report results scientifically. They are also assessed on their ability to communicate why certain phenomenon are observed and make statements about future protocols to explore. Graduates are also assessed by external judges on their technical writing skills to assemble Design History Files (DHF) and Device Master Records (DMR) describing their innovative research in senior design.

Scientific Laboratory Reports: graded 1-4

DHF and DMR subsections of the Senior Design Faculty Evaluations: graded 1-5

For written communication in BME labs (graded 1-4) the metric is:

4.0 - 3.6 Expert

3.6 - 3.2 Proficient

3.1 - 2.8 Apprentice

2.7 - 2.4 Novice

<2.4 Poor

For written communication in Senior (BME4908) graded 1-5 the metric is:

5 Excellent

4 Very Good

3 Good

2 Fair

1 Poor

* + 1. Results –
       1. BME Lab Evaluation - Avg Score 3.50; 143 students scored 2.5 or above (N=168)
       2. Senior Design Faculty Assessment - Written - Avg Score 4.80;   
          18 teams scored 3.125 or above (N=18)

# of Teams Reported for Each

Excellent (8)

Very Good (9)

Good (1)

Fair (0)

Poor (0)

* + - 1. Analysis:

1. Communicate Effectively in BME - Oral - Graduates will be able to communicate effectively to their peers orally (through presentations/posters) in the field of Biomedical Engineering.
   1. Rubric -

Graduates are assessed by external judges in their ability to communicate their senior design projects through live presentations, followed by a Q & A. This includes the graduate’s ability to define the gap in knowledge, the social and/or environmental impacts, and the scientific details of their innovation(s).

15-20 minute oral group presentations graded by a score sheet filled out by the faculty mentor: graded 1-10

* + 1. Results –
       1. Senior Design External Assessment – Oral - Avg Score 4.63;  
          16 teams scored 2.5 or above (N=18)  
          Score mapped to 4.0 scale to make comparing criteria similar across assessments.
       2. Analysis: