2012-2013 Undergraduate Academic Assessment Plan

Biomedical Engineering

College of Engineering

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J. Crayton Pruitt Family Department of Biomedical Engineering, College of Engineering
Undergraduate Academic Assessment Plan

Mission Statement
The J. Crayton Pruitt Family Department of Biomedical Engineering at the University of Florida is dedicated to developing innovative and clinically translatable biomedical technologies, training future generations of biomedical engineers, and cultivating leaders by nurturing the integration of engineering, science, and healthcare in a discovery-centered educational and research environment.

This department mission is closely and integrally aligned with the mission of the college that states:

The College of Engineering fosters and provides world-class programs in engineering education, research and service to enhance the economic and social well-being of the citizens of Florida, the nation and the world.

In addition, the department is leading the college's strategic initiative in health care in becoming the drivers for innovation in imaging, neural engineering, and tissue engineering / regenerative medicine.

Student Learning Outcomes (SLOs)
Existing SLOs in the 2012-13 undergraduate catalog:

1. Apply knowledge of mathematics, science and engineering principles to biomedical engineering problems.
2. Design and conduct biomedical engineering experiments and analyze and interpret the data.
3. Design and build biomedical devices within the constraints of safety and efficacy requirements of application to living organisms.
4. Communicate technical data and design information effectively in writing and in speech to other biomedical engineers.

Revised SLOs for the 2013-2014 undergraduate catalog:

<u>Content Knowledge</u>

1. Solve biomedical engineering problems by applying knowledge of mathematics, science, and engineering principles.

2. Design and conduct biomedical engineering experiments and analyze and interpret the data.

Critical Thinking

3. Design a biomedical device, component, technology, or process to meet identified clinical needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and regulatory constraints.

Communication

4. Communicate technical data and design information effectively in speech and in writing to other biomedical engineers.

Curriculum Map

Curriculum Map for:

J. Crayton Pruitt Family Department of Biomedical Engineering College of Engineering

Key: **I**ntroduced **R**einforced **A**ssessed

Courses SLOs	BME3060	BME4409	BME4503	BME4503L	BME4882	BME4883
Content Knowledge						
#1 - Solve biomedical engineering problems by applying knowledge of mathematics, science, and engineering principles.	A – Homework	A – Exam, Project Assignment				
#2 - Design and conduct biomedical engineering experiments and analyze and interpret the data.	I	I	R	A – Experiment Report		
Critical Thinking						
#3 - Design a biomedical device, component, technology, or process to meet identified clinical needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and regulatory constraints.	I	I	I	R	A – Design Report	A – Development Report
Communication						
#4 - Communicate technical data and design information effectively in speech and in writing to other biomedical engineers.	I	R	R	R	A – Design Presentation	A – Development Presentation

Assessment Cycle

The inaugural undergraduate class will be entering the fourth year of the curriculum during the 2013 – 2014 semester. This first assessment cycle will be aligned with assessments to support the engineering accreditation process under ABET. SLOs will be assessed initially during the 2013-2014 academic year in the classes shown above and the following year. It will continue biannually thereafter. The cycle will include the following action items:

- Assessment of the individual SLOs by the instructors of the courses
- Review of assessment results by the Undergraduate Affairs / ABET Committee that will make recommendations for improvement actions
- Review by the department faculty and decision on recommendations by the Undergraduate Affairs / ABET Committee

Assessment Cycle Chart

Assessment Cycle for:

J. Crayton Pruitt Family Department of Biomedical Engineering College of Engineering

Analysis and Interpretation: May – June
Improvement Actions: Completed by August 15
Dissemination: Completed by September 30

Year / SLOs	13-14	14-15	15-16	16-17	17-18	18-19
Content Knowledge						
#1	X	X		X		X
#2	X	X		X		X
Critical Thinking						
#3	X	X		X		X
Communication						
#4	X	X		X		X

Methods and Procedures

The techniques used to assess SLO performance are Outcome Assessment Forms for homework, exams, and lab experiment reports and Senior Design Assessment Matrices for design reports and presentations. Outcome Assessment Forms provide direct assessment of student performance on outcomes by individual instructors. Outcomes are assessed through specific exam questions, quizzes, homework problems, or other assignments that are identified as being specifically related to that outcome. Senior Design Assessment Matrices will be compiled from a panel of faculty and industrial experts participating in the project reviews.

There is expected to be some correspondence between the outcome assessment and the grading of any particular problem or assignment, project report or presentation, and a student's overall grade on an exam or for a course does not necessarily correspond to overall performance on any particular outcome. An Outcome Assessment Form and a Senior Design Assessment Matrix are included at the end of this document.

The metric used to identify adequate achievement of an outcome is that 80% of the students receive a 3.0 or higher on the outcome assessment. The 3.0 score has been identified as the standard representing acceptable achievement of the outcome. The performance of 80% of the students at this level has been selected as a statistically representative sampling. While it is desirable to achieve 100% of the students at this level, this is unlikely in any single course. When considered across the entire curriculum, the 80% level provides reasonable assurance that any particular student has demonstrated adequate performance on each outcome at some point in the curriculum.

SLO Assessment Matrix

2012-2013 Learning Outcome	Assessment Method	Measurement Procedure
#1 - Solve biomedical engineering problems by applying knowledge of mathematics, science, and engineering principles.	Homework – BME3060	Outcome Assessment Form
	Exam, Project Assignment – BME4409	
#2 - Design and conduct biomedical engineering experiments and analyze and interpret the data.	Experiment Report – BME4503L	Outcome Assessment Form
#3 - Design a biomedical device, component, technology, or process to meet identified clinical needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and regulatory constraints.	Design Report – BME4882	Senior Design Assessment Matrix
	Development Report – BME4883	
#4 - Communicate technical data and design information effectively in speech and in writing to other biomedical engineers.	Design Presentation – BME4882	Senior Design Assessment Matrix
	Development Presentation – BME4883	

Outcome Assessment Form
J. Crayton Pruitt Family Department of Biomedical Engineering
University of Florida

Course Title: _____ **Instructor:** _____
Course Number: _____ **Semester:** _____

Assessed Outcome:

Method of Assessment (*check all that apply*)

☐ Quiz Question
☐ Exam Question
☐ Homework Question
☐ Lab Report
☐ Research Paper
☐ Oral Presentation

☐ Other (*specify*) _____

Students are assessed on a scale of 1 – 5: 1 indicating unsatisfactory performance, 3 indicating performance that meets expectations, and 5 indicating outstanding performance. Performance levels corresponding to each of these values are defined in the rubrics associated with this outcome. The target is that 80% of the students earn a minimum score of 3.

Major Changes in Course Since Last Assessment (*if applicable*):

Results of Assessment

Score	Number of Students	Percentage of Students
1.0 – 1.9		
2.0 – 2.9		
3.0 – 3.9		
4.0 – 4.9		
5.0		

Percentage of Students Scoring 3 or Higher: _____
☐ Performance criterion was met
☐ Performance criterion was not met

Comparison to Last Assessment Results:
☐ Performance criterion was met both times
☐ Performance criterion was not met last time but has now been met. The changes made improved performance adequately
☐ Performance criterion was not met. Further changes are needed to meet the performance criterion.

Recommended Changes:

Senior Design Assessment Matrix
Detailed Design Presentation

Reviewer: _____ **Date:** _____

Team Name			
	5 – Outstanding Performance	3 – Meets Expectations	1 – Unsatisfactory
Project goals	☐ Team can clearly communicate project goals and priorities	☐ Project goals and priorities are available, but cannot be concisely shared	☐ Project goals are unclear
Design	☐ Well-conceived, achievable, and thoroughly documented design	☐ Most system elements are defined, but some important elements missing	☐ Major design flaws identified, design is too ambitious to be achieved, documentation weak
Prototype	☐ A first prototype has already been developed and a final prototype is on track for fabrication and testing	☐ Team will deliver a prototype and most of it will be tested against the product design specifications	☐ Delivery of a functioning, partially tested prototype is doubtful
Project plan	☐ Project tasks are all defined, including dependencies, resources, schedule and risks; team updates the plan frequently	☐ Project plan reflects the standard IPPD deliverables but few sub-tasks or dependencies are provided. Resources may not be assigned; plan is not kept up to date	☐ Project plan is out of date, incomplete, and is of little use to the team.
Project risks	☐ Project risks have been described and prioritized based upon likelihood of occurrence and negative impact potential. Mitigation strategies have been developed and resources have been assigned	☐ Most project risks have been identified and priorities are established. Mitigation has been mostly thought through and some resources have been assigned.	☐ Team has identified few risks and has not thought through priorities or mitigation strategies.
Team member assignments	☐ Team members each have a clear role and the work load is balanced across the team	☐ Team members have assigned roles and most are performing. Work load is moderately balanced	☐ Team is loosely organized and only one or two members are carrying the load
Issues identified			
Recommended next steps or actions			
Overall assessment	☐ Team is on track and a successful project outcome that satisfies all of the customer's needs is highly likely	☐ Project has manageable risks and a successful outcome is possible. Most of the customer's needs can be met.	☐ Project is headed for disaster and will fail without aggressive corrective action to mitigate major risks

Assessment Oversight

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