FACULTY **C**OURSE **A**SSESSMENT **R**EPORT

Department of Biomedical Engineering

Academic Year: **2012-2013**
Term: **Fall 2012, Winter 2012, Spring 2013**

Course Code and Title: **BME180A-B-C Biomedical Engineering Design**

Instructor: **Tibor Juhasz, PhD**

Background: Please review the *Accreditation background* document.

Instructions: For each student outcome performance indicator, identify (1) the assignment (which quiz, quiz problem, exam problem, or project) was used to assess that indicator, (2) the maximum score possible on that assignment, (3) the performance standard for that assignment expressed in points and also as a percentage of max, (4) the number of students who were assessed on that assignment, (5) the average score achieved by them expressed in points and percentage of max, and (6) the number and percentage of BME students who achieved the performance standard.

Performance Indicators (PIs): This course assesses the following Performance Indicators (please consult the *Proposed Remapping of BME courses to Student Outcomes* document): **a1-3, b1-3, c1, d1-4, e1-2, g1-2, h1, j1, k2-3**

a1 — Students can apply knowledge of mathematics to problems in Biomedical Engineering.
a2 — Students can apply knowledge of science to problems in Biomedical Engineering.
a3 — Students can apply knowledge of engineering to problems in Biomedical Engineering.
b1 — Students can design biomedically relevant experiments.
b2 — Students can conduct biomedically relevant experiments.
b3 — Students can analyze and interpret data from biomedically relevant experiments (including living systems).
c1 — Students can design a biomedical system to meet desired needs within realistic constraints.
d1 — Students understand team and project objectives.
d2 — Students combine skills and methods from different disciplines.
d3 — Students participates in team activities.
d4 — Students complete assigned duties.
e1 — Students can identify and formulate biomedical engineering problems.
e2 — Students can develop a solution to biomedical engineering problems.
g1 — Students can communicate orally technical issues related to biomedical engineering.
g2 — Students can communicate in writing technical issues related to biomedical engineering.
h1 — Students understand the impact of biomedical engineering solutions in economic, environmental, and societal context, both locally and globally.
j1 — Students understand contemporary biomedical issues in economic, environmental, and societal context.
k2 — Use software tools to model biomedical systems, and analyze and interpret biomedical data.
k3 — Students are proficient in using computer-aided design tools for biomedical applications.

PIs	Assignment used for assessment	Max. score	PI standard and % of maximum	Number of students tested	Average score and % of maximum	Number and % of BME students who met the standard
a1	LABVIEW Assignment	100	66.6 (66.6%)	69	78.4 (78.4%)	61 (88.4%)
a2	LABVIEW Assignment	100	66.6 (66.6%)	69	78.4 (78.4%)	61 (88.4%)
a3	LABVIEW Assignment	100	66.6 (66.6%)	69	78.4 (78.4%)	61 (88.4%)
b1	Prototypes, Validation Protocol, Data Presentation	20	16 (80%)	69	18.8 (94%)	68 (98.5%)
b2	Prototypes, Validation Protocol, Data Presentation	20	16 (80%)	69	18.8 (94%)	68 (98.5%)
b3	Prototypes, Validation Protocol, Data Presentation	20	16 (80%)	69	18.8 (94%)	68 (98.5%)
c1	Final Report, Detailed Design Document	60	48 (80%)	69	52.5 (87.5%)	68 (98.5%)
d1	In class presentations, team meetings, fall midterm report	10	8 (80%)	69	8.9 (89%)	68 (98.5%)
d2	In class presentations, team meetings, fall midterm report	10	8 (80%)	69	8.9 (89%)	68 (98.5%)
d3	In class presentations, team meetings, ARC team building, leadership workshops	10	8 (80%)	69	8.9 (89%)	68 (98.5%)
d4	In class presentations, team meetings, Final Report	10	8 (80%)	69	8.9 (89%)	68 (98.5%)
e1	Final Report, Requirements Document	25	20 (80%)	69	20.5 (82%)	66 (95.7%)
e2	Final Report, Detailed Design Document	60	48 (80%)	69	55.8 (0.93%)	68 (98.5%)
g1	Final Presentation	120	96 (80%)	69	106.3 (88.6%)	68 (98.5%)
g2	Final Report, reading assignment	140	112 (80%)	69	127.6 (91.2%)	68 (98.5%)
h1	Final Report, DD Studio Innovation Camp, reading assignment	140	112 (80%)	69	127.6 (91.2%)	68 (98.5%)
j1	Final Presentation, DD Studio Innovation Camp, Final Report	120	96 (80%)	69	106.3 (88.6%)	68 (98.5%)
k2	LABVIEW Assignment, Final Report	100	66.6 (66.6%)	69	78.4 (78.4%)	61 (88.4%)
k3	Solid Works in-class assignment, LABVIEW assignment, Final Report	100	66.6 (66.6%)	69	72.6 (72.6%)	58 (84.1%)

Course Learning Outcomes: This course assesses the following Course Learning Outcomes (please consult your *Course Outline* document):

1. Demonstrate leadership and teamwork skills in a project team environment
2. List and define the various steps in bringing a biomedical product from concept to market
3. Identify the realistic constraints of the team project
4. Identify the assess challenges in each of the steps
5. Incorporate regulatory and ethical aspects in the team project.
6. Articulate the impacts of the project in a global, economic, environmental, and societal context.
7. Use knowledge in mathematics, statistics, biological sciences, physical sciences, and engineering to solve the problems at the interface of engineering and biology whenever required
8. Use the appropriate computer tools to design, model, simulate, and/or operate the team projects

9. Apply engineering principles and practices to meet the challenges
10. Demonstrate oral communication skills in presenting team projects.
11. Demonstrate written communication skills in documenting team projects
12. Establish initial contacts with major local and national BME companies
13. Demonstrate knowledge of contemporary issues related to biomedical engineering
14. Identify relevant technical conferences, workshops, biomedical trade shows, and professional societies to engage in life-long learning

CLOs	Assignment used for assessment	Performance standard	Number of students tested	Average score (%)	Number and % of BME students who met the standard
7, 8, 9	LABVIEW Assignment	66.6%	69	78.4%	61 (88.4%)
8, 9	Solid Works in-class assignment	66.6%	69	72.6%	58 (84.1%)
1,2,3,4, 5,6,7,10	Final Presentation	80%	69	88.6%	68 (98.5%)
11,13	Final Report	80%	69	91.2%	68 (98.5%)
12,14	Prototype Design and Build	80%	69	88.6%	68 (98.5%)

What changes did you make in this course based on previous assessment results?

Added LABVIEW and Solid Works training

Increased time available to prototype building and testing

What recommendations do you have for improving the course the next time it is taught?

More lectures on the design process and especially on design requirements should be added at the beginning of the first quarter

What recommendations do you have, if any, regarding prerequisite courses or other ways to improve student preparation for this course?

LABVIEW and Solid Works experience should be established prior to the senior design course

Any other recommendations or comments?

A dedicated lab space for prototype building a testing would be beneficiary.