2012-2013 Undergraduate Academic Assessment Plan

Mechanical Engineering

College of Engineering

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Mechanical Engineering, College of Engineering Undergraduate Academic Assessment Plan

Mission Statement

The mission statement as published in the 2012-2013 Undergraduate Catalog:

> *The mission of the undergraduate program is to serve the state of Florida, the United States and the engineering profession by providing quality educational programs in mechanical engineering; conduct a nationally recognized research program; and foster ongoing professional development of students and faculty.*

The mission statement of the mechanical engineering program supports the college of engineering mission. Both explicitly seek to provide world-class programs in engineering education, research and service to the citizens of Florida and the nation. The mission statement for the mechanical engineering program addresses the needs of the engineering profession which is consistent with the qualities of graduates cited in the college mission statement, i.e. vision, values, leadership and professional expertise.

The mission statement of this unit supports the university's mission statement by directly addressing the areas of teaching, research and scholarship, and service. The mission of the program is critically important to the mission of the university as a land-grant, sea-grant and space-grant research university.

Student Learning Outcomes (SLOs)

The Student Learning Outcomes (SLOs) describe knowledge and academic abilities students will possess as a result of completing the undergraduate degree. The current (2012-2013 Undergraduate Catalog) SLOs for the BS Mechanical Engineering degree program are:

1. Apply knowledge of mathematics, science and engineering principles to mechanical engineering problems.
2. Design and conduct mechanical engineering experiments and analyze and interpret the data.
3. Design a mechanical engineering system, component or process to meet desired needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability constraints.
4. Communicate technical data and design information effectively in speech and in writing to other mechanical engineers.

SLO1 and SLO2 are measures of Content Knowledge. SLO3 is a measure of Critical Thinking. SLO4 is a measure of Communication.

The curriculum map illustrates how the SLOs are related to required courses in the degree program and identifies the assessments used for each SLO.

Curriculum Map

Curriculum Map for:

Program Mechanical Engineering College of Engineering

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

Courses / SLOs	EGM 2511	EGM 3344	EGM 3401	EGM3 520	EGM 4313	EGN3 353C	EML 2920	EML 2023	EML2 322L	EML3 100	EML3 301C	EML4 304C	EML4 312	ENC3 254	EML 3005	EML 4140	EML4 147C	EML 4220	EML4 314C	EML 4321	EML 4500	EML 4501
Content Knowledge																						
#1	I	R	R	A Embedded Question	R	R			R	A Embedded Quesiont	R	R	A Embedded Question		R	R	R	R	R	R	R	R
#2											I, A Lab Report	A Lab Report					R		R			R
Critical Thinking																						
#3	I			R				R	A Design Project			A Design Project	R		R		R	R	R	R	R	A Design Project
Communication																						

#4							I	R	A Written Report		A Written Report	A Oral Report		R	R		R		R		R	R

SLO #1: Apply knowledge of mathematics, science and engineering principles to mechanical engineering problems.

SLO #2: Design and conduct mechanical engineering experiments and analyze and interpret the data.

SLO #3: Design a mechanical engineering system, component or process to meet desired needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability constraints.

SLO #4: Communicate technical data and design information effectively in speech and in writing to other mechanical engineers.

Assessment Cycle

The SLO are assessed on a two year rotation in the spring semester of each year with SLO1 and SLO3 being assessed in odd years and SLO2 and SLO4 being assessed in even years (ex. Spring 2012 is an even year in which SLO2 and SLO4 are assessed, Spring 2013 is an odd year in which SLO1 and SLO3 are assessed). Direct assessment data from the courses indicated in Figure 1 is supplemented by various forms of indirect assessment data including anecdotal feedback from faculty, graduating student exit interviews, feedback from employers, and alumni surveys. Results of the assessments are evaluated by faculty outcome committees developed for each SLO. The evaluation results from the faculty outcome committees are then presented to the entire departmental faculty. Evaluation results are discussed by the general faculty at the annual faculty planning meeting held in August of each year. Various faculty working groups including the departmental curriculum committee, course committees, and ad hoc working groups incorporate the feedback into improvements to the program. Results of the assessment cycle are communicated to the departmental faculty and the departmental external advisor board at least annually at the spring external advisory board meeting held in April of each year.

Assessment Cycle Chart

Assessment Cycle for:

Program: Mechanical Engineering	College of Engineering
Analysis and Interpretation:	August
Improvement Actions:	Completed by March
Dissemination:	Completed by April

Year / SLOs	10-11	11-12	12-13	13-14	14-15	15-16
Content Knowledge						
#1	X		X		X	
#2		X		X		X
Critical Thinking						
#3	X		X		X	
Communication						
#4		X		X		X

Methods and Procedures

SLO Assessment Matrix		
2012-13 Student Learning Outcome	**Assessment Method**	**Measurement Procedure**
SLO 1: Apply knowledge of mathematics, science and engineering	Direct assessment using embedded question on exam	Performance evaluated using faculty established rubric

principles to aerospace engineering problems.		
. **SLO 2:** Design and conduct aerospace engineering experiments and analyze and interpret the data.	Direct assessment using embedded questions on exam	Performance evaluated using faculty established rubric
SLO 3: Design an aerospace engineering system, component or process to meet desired needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability constraints	Direct assessment using written design report	Performance evaluated using faculty established rubric
SLO 4: Communicate technical data and design information effectively in speech and in writing to other aerospace engineers.	Direct assessment using written reports and oral presentations	Performance evaluated using faculty established rubric

Direct assessment measures are used for all SLOs as indicated in the SLO Assessment Matrix. The direct assessment measures utilized include embedded questions on exams, grades on written assignments and reports, or grades on oral presentations. Sub grades on written assignments and reports are utilized when appropriate so that the reported direct assessment measure is related solely to the specified SLO. For example, the grade for clarity of figures and graphs on a report (related to written communication on SLO#4) is segregated from the grade on technical content.

Additional indirect assessment measures are used to gather input on student achievement of the SLOs. Graduating students are asked to self report on their level of achievement of the SLOs in a required exit interview. Alumni are periodically contacted (3, 5 and 7 years after graduation) and asked to complete a survey. As a part of the alumni survey, they are asked to rate the level of preparation they received relative to each SLO. Anecdotal input is also collected from instructors in courses about the level of student performance.

An example of an assessment tool is included in Figure 1. The tool makes use of an excel spreadsheet for data collection and transmittal of the results to faculty outcome committees for evaluation and recommendations for continuous improvement actions. The grading rubric is included section 10 of the excel spreadsheet of Figure 1.

Figure 1: Example of SLO Assessment Tool

Department of Mechanical and Aerospace Engineering
University of Florida
Direct Assessment Summary Worksheet
Instructions: Complete items 1) thru 11) highlighted in blue

Course Number: EML4312
Course Title: Control of Mechanical Engineering Systems
Instructor: Schueller
Semester: Spring 2012

1) Form completed by:	John K. Schueller
2) Date assessment data was collected:	5/3/2012
3) Date this form was completed:	5/7/2012

Assessed Outcome: (a) Apply knowledge of mathematics, science, and engineering

Performance Indicator: (Specific aspect of the outcome to be assessed)
Students will perform a numerical solution to a differential equation when solving an engineering analysis problem

4) Method(s) of assessment (please use the tool(s) listed in the syllabus for assessing this outcome; ex. HW, quizzes, exams, projects, lab reports, etc.)
Multipart problem on the final exam.

5) Assessment of Performance Indicator *(describe specifically how the performance indicator listed above was assessed; ex. the problem required students to use integration to find the centroid of a 2-D shape.)*

Students were required to find the response of the system described by the differential equation to different inputs.

6) Assessment measures *(Further describe the measurement tool used (i.e. expand upon your answer to box (5) above). Explain any special aspects of the problem. Attach a copy of the measurement tool (ex. attach copy of a test question))*

There were four parts to the question for the different inputs and determining characteristics of the system as indicated by the differential equation.

7) Interpretation of assessment results *(provide your interpretation of the assessment results, significant issues the results illustrate, etc.)*

The results indicate sufficient mastery of the subject

8) How will the results of assessment be used to make improvements? *(discuss how you think the results should be used to change this course or related courses)*

There is no need to change this particular element.

9) Other *(list any additional information you wish to report. Include suggestions for alternate or improved performance indicators for future use.)*

10) Describe the grading rubric used for the assessment and how student performance was mapped to the performance levels listed below. (*ex. 5 = exemplary performance, 4 = minor alegrabic error but all calculus concepts correct, 3 = minor conceptual errors on calculus concepts and/or numerous algebraic errors, 2 = significant trouble with calculus concepts, 1 = unable to demonstrate any knowledge of calculus concepts)*

5 = none wrong = perfect performance, 4 = 1 wrong = very good performance, 3 = 2 wrong = good performance, 2 = 3 wrong = poor performance, 1 = 4 or 5 or 6 wrong = very poor performance.

Assessment Oversight

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