Sibley School Procedure for Assessing Non-Design Courses

GOAL

The goal of this document is to describe the mechanism for regular assessment and feedback for the Sibley school's courses. This document covers all courses other than capstone design courses.

ASSESSMENT RULES AND PROCEDURES

1. Schedule:

   These regular assessments will be conducted bi-annually, in calendar years 2011, 2013, 2015, etc.

2. Courses that must be Assessed:

   To require an assessment, a course must fulfill all the conditions below:

   a) The course must be a MAE or MAE-cross-listed course at the level 4xxx or below, or it must be a MAE or MAE-cross-listed course at the level 5xxx that can be used as a major-approved elective.

   b) At least three ME undergraduates must be enrolled in the course during the assessment year (or prior year, for courses not offered in the assessment year).

   c) The offering department must be MAE or a non-ABET-accredited department.

   d) It must be possible to use the course in at least one of the following roles in the curriculum: required course, major-approved elective, or technical elective.

3. Required Written Assessments.

   A written ABET assessment must be prepared by the instructor of each course as defined in Part 2.

   The assessment must cover each of the course objectives as described in the course syllabet. The syllabet describes the agreed-upon minimum content of the course. Any changes to the syllabet must be approved by the Sibley School faculty. A sample syllabet is appended to this document.

   To assess student achievement of the course objectives, the instructor may use direct quantitative measures such as scores on homework and exam problems (preferred), or direct qualitative measures such as his or her general impression. Indirect measures such as student comments in teaching evaluations may also be used.

   The assessment should include a plan for course improvement.

4. Presentation of Course Assessments to the Sibley Faculty and Feedback from the Faculty:

   Every course instructor must present his or her assessment report to a meeting of a group of the Sibley school faculty so that the faculty can provide feedback. Normally, two assessment meetings will be held at the end of each of the 2 semesters out of 4 that constitute assessment

semesters. Every instructor will attend one or the other of these meetings. Each instructor will make an informal oral presentation of his or her assessment and of any recommended improvements to the course. This presentation need not involve the preparation or delivery of any visual presentation materials such as power-point slides.

The Sibley faculty will provide feedback to the course instructors as appropriate.

These meetings will be documented. The oral presentation of assessments and any feedback may be recorded by electronic means or in the form of minutes of the meeting. The presenting instructors are encouraged to make written notes about any feedback from the faculty. Minutes of each meeting will be generated. These minutes will record which courses have been assessed and who presented the assessments.

The UPC is responsible for reviewing the notes of the course assessment meetings and making recommendations as needed, each semester in which course assessment meetings are held. The UPC is also responsible for periodically reviewing the attainment of program outcomes, on the basis of the list of program outcomes supported by each course objective and the level of attainment of course objectives. This review shall take place every four years, in 2011, 2015, etc., or more frequently.

SAMPLE SYLLABET

Department, number, and title of course: Mechanical & Aerospace Engineering 488, Introduction to Packaging Using Anisotropic Natural Materials

Designation as a 'Required' or 'Elective' course: Elective

Course (catalog) description: Spring. Also offered in the summer through the Cornell study abroad program at Cornell in Tahiti. 4 credits.

Introduction to the design, analysis, and fabrication of packaging and other structures made by weaving strongly anisotropic natural materials, such as reeds, fronds, and twigs. Topics include material selection, structural design and analysis, prediction of life-cycle performance, and design for aesthetics.

Prerequisite(s): MATH 294, M&AE 325, ART 141.

Textbook(s) and/or other required material:

Web Designs for the 21st Century, W. Gaits, Pretentious Hall, 2000.

Basket Weaving for Engineers, D. Ralliday and R. Hesnick, J Smiley & Sons, Fifteenth edition, 2004.

Course objectives:

On completion of the course, students should:

1. Know and understand the primary analytical, computational, and experimental tools for analyzing and simulating the material and functional properties of containers and other structures ('baskets', for brevity) woven from strongly anisotropic natural materials (MAE/ABET outcomes a, b, e and k);
2. Know and understand key aesthetic concepts pertinent to basket design, and tools for analyzing the aesthetics of particular designs (MAE/ABET outcome c);
3. Know and understand the two major manufacturing paradigms (artisan, automated) used to weave baskets;
4. Be able to design and make a basket to meet specified load, aesthetic, and durability requirements (MAE/ABET outcome c);
5. Be able to conduct load and fatigue tests on baskets (MAE/ABET outcomes b and k);
6. Be able to learn, through self study, new techniques for design, analysis, or fabrication of baskets that are made from anisotropic natural materials (MAE/ABET outcome i).

Topics covered:

- Anisotropic material properties, solid mechanics, and failure modes of engineering grade marsh reeds and palm fronds.
- Load and deformation analysis of woven web structures.
- Experimental load testing, the how-many-bananas-till-the-bottom-falls-out test.
- Fast furrier cross-weave transforms.

- CAD of curvilinear baskets to meet volumetric and aesthetic requirements
- Fatigue analysis of marsh reeds and palm fronds.
- Experimental fatigue testing, the how-many-miles-on-a-camel-till-the-handles-break test.
- Experimental toughness testing, the how-long-does-it-take-the-TA-to-break-out test.
- Weaving, the basic basket.
- Numerically controlled weaving of high-tech plant-tissue-based packaging: CD cases, laptop carriers, artistic cell phone bodies, etc.
- Advanced weaving project in which students must learn a new technique through self study and apply it. Possible topics include straw lamp shades, thatched roofs, Popsicle stick art, etc.

Class/laboratory schedule, i.e., number of sessions each week and duration of each session: Three 50-minute lectures each week. Labs meet every week during the semester for 2 hours and 30 minutes. During the last 4 weeks of the semester the lab becomes an open lab in order to accommodate the student projects and in order to enable the regular feeding of any TAs who are still tied up with earlier lab exercises.

Contribution of course to meeting the professional component: This course is an elective in the mechanical systems and materials processing track of the field program. It contributes engineering sciences and engineering design topics to the ME Professional Component.

Relationship of course to program outcomes: This course meets MAE/ABET Outcomes a, b, c e, i, and k and Program Educational Objectives 1, 2, and 3.

Outcome Assessment: Outcomes will be assessed using graded homework assignments, graded lab exercises, prelim and final examinations, and a final course project.

Person(s) who prepared this description and date of preparation:

Mark Psyche and Erb Volkswagon

April 1, 2004

SAMPLE COURSE ASSESSMENT

MAE 488 -- Course Assessment Report Based on Spring Semester 2004

Course Outcomes and Mapping to ME/ABET outcomes:

1. Know and understand the primary analytical, computational, and experimental tools for analyzing and simulating the material and functional properties of containers and other structures ('baskets', for brevity) woven from strongly anisotropic natural materials (ME/ABET outcomes a, b, e and k).
2. Know and understand key aesthetic concepts pertinent to basket design, and tools for analyzing the aesthetics of particular designs (ME/ABET outcome c).
3. Know and understand the two major manufacturing paradigms (artisan, automated) used to weave baskets.
4. Be able to design and make a basket to meet specified load, aesthetic, and durability requirements (ME/ABET outcome c).
5. Be able to conduct load and fatigue tests on baskets (ME/ABET outcomes b and k).
6. Be able to learn, through self study, new techniques for design, analysis, or fabrication of baskets that are made from anisotropic natural materials (ME/ABET outcome i).

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ASSESSMENT

The level of attainment of each outcome has been assessed by the instructor based on the evidence of grades on homework problems, lab exercises, exam questions, and the design project. This raw data was reviewed and interpreted on a scale of 1 to 3, with the following meanings: 1- not achieved, 2 - partially achieved, 3 - fully achieved. The assessments and the supporting evidence are as follows:

Course Outcome	**Achievement Rating**	**Evidence**
1	3	Homework Assignments 1-7, Labs 1-3, Prelim Exam Q1, Q2, & Q4, Final Exam Q1 & Q3
2	2	Homework Assignments 5 & 8, and 9 Design Project, Prelim Exam Q3, course journal
3	3	Homework Assignments 9 & 10 Prelim Exam Q5, Final Exam Q2

4	2	Labs 4-6, Design Project, Prelim Q5, Final Exam Q4 & Q5, course journal
5	3	Labs 7 and 8 and Design Project
6	3	Design Project

IMPROVEMENT PLAN IN RESPONSE TO OUTCOME ASSESSMENT

1. This semester showed the extreme difficulty of communicating concepts of aesthetics to engineering students. While mid-course corrections were made to try to address this problem, in the future even more needs to be done. The plan for the next offering of this course is to include two guest lectures on aesthetics in 3-dimensional design, one by a fine-arts professor of sculpture and another by an architecture professor. In addition, a new assignment will be developed that involves review of designed objects ranging from buildings to cell phones and the generation of written critiques of the designs in terms of their aesthetics elements.
2. In addition to problems with aesthetics, the students had trouble with the concept of design for durability. A future offering of the course will replace one of the existing design labs with one where old used baskets will be dissected and analyzed in teach design for durability by demonstrating the long-term effects of good and bad design choices.

ADDITIONAL IMPROVEMENT PLANS BASED ON THE INSTRUCTOR'S OBSERVATIONS ABOUT THE FIELD AND ABOUT THE COURSE

The modern use of baskets is undergoing a radical transformation, and the course needs to be updated to reflect these changes. Plastic containers are replacing woven baskets in many traditional applications such as hauling dried dates and bananas on camel back. At the same time, new application areas are arising in the electronics manufacturing industry, where baskets are increasingly the container of choice for storing chips on automated machinery that populates printed circuit boards with chips. This means that the scale of commercial baskets is decreasing. This decrease in scale will force the introduction of new materials and new analysis techniques. Over the next 3 years the materials and functional analysis part of the course will have to be updated to reflect these changes as will the labs.

Person(s) who prepared this assessment and date of preparation:

Mark Psyche

April 1, 2004