

## DIVISION OF ENGINEERING & PHYSICS

### Integrated Engineering Program

Note: The following objectives, educational outcomes and assessment criteria are stated in a format consistent with ABET's guidelines for accreditation.

#### Expanded Statement of Institutional Purpose

##### Mission Statement:

The mission of the Integrated Engineering program is to support and realize with excellence the overall mission and vision of the University and to provide a broadly based, cross-disciplinary engineering education founded upon a design-oriented curriculum which integrates several disciplines into a whole, enabling graduates to undertake the wide variety of design and manufacturing challenges that modern industry faces.

##### Educational Objectives:

The Integrated Engineering program educational objectives are stated in terms of characteristics of graduates of the program 2 to 4 years after graduation. Students completing the baccalaureate degree in Integrated Engineering will have:

- A. a solid understanding of the fundamentals of mathematics, physical science, and engineering science, which re-occur in diverse technical applications and form the foundation for work in all fields of engineering;
- B. the ability to practice engineering design and analysis and to integrate several engineering concepts into a system or process;

#### Program Outcomes

The standards and competencies that the student will have met and achieved at the time of graduation are expressed in terms of the characteristics of the program's graduates, which are the educational outcomes required for accreditation by the Accreditation Board for Engineering and Technology (ABET). Each graduate will have:

- a. an ability to apply knowledge of mathematics, science, and engineering;
- b. an ability to design a system, component, or process to meet desired needs;
- c. an ability to function on multidisciplinary teams;
- d. an ability to identify, formulate, and solve engineering problems;
- e. an understanding of professional and ethical responsibility;
- f. an ability to communicate effectively;
- g. the broad education necessary to understand the impact of engineering solutions in a global and societal context;
- h. a recognition of the need for, and an ability to engage in life-long learning;
- i. a knowledge of contemporary issues;

#### Means of Program Assessment and Criteria for Success

Successful demonstration of skills and knowledge embodied in the program outcomes is a clear indication that Integrated Engineering graduates are well equipped to achieve the Program Educational Objectives as they progress in their careers. Each Program Educational Objective is supported by at least one Program Outcome and thus, if the program outcomes are satisfied, the program educational objectives are automatically satisfied.

The tools used to assess the program outcomes include:

- Course Survey.
- Course Assessment.
- Review of Design Projects.
- Student Exit Survey.
- FE Exam.
- Alumni Survey.
- Employers Survey.

A thorough program self-study report has been prepared for the Integrated Engineering program and was submitted to ABET and to SUU's administration. The self-study includes detailed discussions of the tools listed above and the criteria for success. The program will be reviewed, on-site, by the ABET visiting team in September 2004.

#### Summary of Data Collected

The Integrated Engineering program has been offered for three years. The program produced its first graduated class in May 2004 and thus, some of the assessment tools described earlier have not yet been used.

- At the end of each term students are asked to rate, on a scale of 1 to 5, the level of achievement of each outcome-related course learning objective listed in the course syllabus. The department secretary administers the survey. The survey is used to gauge students' perception of what course objectives were achieved and how well. This survey was conducted for the first time in Spring 2004 and is expected to be completed by the end of Spring 2005.
- Each course syllabus includes a matrix showing outcome-related course learning objectives and their relationships to the Program Outcomes. At the end of each term the instructor in charge of the course and other faculty members familiar with the subject matter covered in the course perform a thorough analysis of the course, including topics covered, achievement of the course objectives, level of difficulty of homework assignments and exams, and students' performance. They also review the course survey results (discussed earlier) and the course of action proposed by the instructor to remedy any shortcomings. A folder is prepared for each required engineering course in the curriculum and contains a course

#### Use of Results

The results of the industry survey conducted last summer led to a revision of the program mission statement, educational objectives, and the curriculum. Changes made are discussed in detail in the program self-study submitted to ABET. Analysis of the results from the Course Survey, Course Assessment, Review of Design Projects, and the Student Exit Survey is ongoing. This analysis and the recommendations of the ABET visiting team will be used to better the program. Assessment of the program is performed using a two-loop process: one loop is used for assessing the Program Educational Objectives and the other loop is used for assessing how well the Program Outcomes are being achieved and for feeding this information back into the curriculum to ensure continuous improvement of the program. The process for assessing the Program Educational Objectives is a four-year cycle and the process for assessing the Program Outcomes is a two-year cycle. Therefore, review of the Program Educational Objectives benefits from two full iterations of assessment and refinement of the Program Outcomes. The two-loop process for assessing the program is described in great detail in the program self-study report submitted to ABET.

**Expanded Statement of Institutional Purpose**  
**(Cont'd)**

- C. the ability to pursue professional careers in multidisciplinary fields by the development of effective teaming abilities and communication skills;
- D. the ability to pursue advanced studies and/or assume leadership roles along diverse career paths;
- E. a strong appreciation for and commitment to ethical responsibilities, professionalism, lifelong learning, and a concern for society and the environment.

**Program Intended Educational Outcomes**  
**(Cont'd)**

- j. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**Means of Program Assessment and Criteria for Success:**  
**(Cont'd)**

It is expected that the Alumni Survey and the Employer Survey will be conducted after the graduates have been employed for two to three years.

**Summary of Data Collected**  
**(Cont'd)**

syllabus showing the outcome-related course learning objectives, sample graded homework assignments and exams, scores and grades earned by the students, results of the course survey, and the analysis mentioned earlier.

- As part of the requirements for the design courses, students prepare a report and make a presentation. A panel composed of faculty and industry representatives attend the presentation and review the projects. The presenters and their work are judged based on several factors, including completeness of project, professionalism, use of media, quality of research, quality of presentation, and team work skills.
- The Student Exit Survey is used to gauge graduating seniors preparedness to enter the professional workplace based on the level of their achievement of the Program Outcomes. Each student is asked to rate, on a scale of 1 to 5, the importance of the Program Outcomes in preparing him/her for post-graduate career and the level of preparation he/she received from the program. All graduating seniors have completed this survey and the results have been analyzed.
- All graduating seniors have taken and passed the FE exam.

In addition to the above, a survey of potential employers of the program graduates was conducted last summer.

**Use of Results**  
**(Cont'd)**

