ANNUAL ASSESSMENT REPORT

ELECTRICAL AND COMPUTER ENGINEERING DEPARTMENT

2008-2009

INTRODUCTION

This annual assessment report details the activities, events, decisions and actions in relation to the process of continuous improvement in the Department of Electrical and Computer Engineering. This year the Department passed a major milestone, the highly anticipated sexennial ABET review. The results of the review appear in the next section. The following two sections discuss curricular changes made this year and a new on-line system to streamline the gathering of assessment information.

ABET REVIEW

ABET is an accreditation organization that reviews and accredits degree-granting programs in applied science, computing, engineering and technology at universities in the United States and beyond. ABET operates independent of government and organizes in a peer-review manner using volunteers from academia and industry. The review cycle requires a program evaluation every six years. The purpose of the review is to establish that a program meets quality standards set by ABET and the program administrators themselves.

The review is carried out by reviewers who visit the institution, and their recommendations are forwarded to the Engineering Accreditation Commission (EAC) of ABET, which commission grants the official accreditation.

Engineering programs with the College of Engineering at USU were reviewed by ABET reviewers in 2008. Two visitors visited the ECE Department in September 2008, one for the electrical engineering degree and one for the computer engineering degree. After making an initial assessment and receiving feedback from the department regarding it, the summary of the review panel is this:

Computer Engineering

Program Strengths:

The computer engineering program benefits from the long and successful history of the department as one of the oldest departments in the college with an established alumni base and industrial contacts.

Facilities are in excellent shape and laboratory space is adequately equipped and maintained.

There are no unresolved weaknesses or unresolved program concerns.

Electrical Engineering

Program Strengths:

The faculty and students of the electrical engineering program combine to provide a dynamic and interactive environment where both can prosper and grow. The faculty members are distinguished and the students are enthusiastic to learn.

The program has an outstanding culminating design process that encompasses a three semester sequence of courses beginning with a fundamental design and project management course and culminates in a number of exceptional student projects conducted in a multidisciplinary environment. The program should be commended for the involvement, enthusiasm, and quality of student capstone design efforts.

The program benefits from enthusiastic and engaged leadership, who are accessible to students and faculty alike.

There are no unresolved weaknesses or unresolved program concerns.

Review Summary

In summary, both programs in the department (computer and electrical engineering) received a six year pass on accreditation from the EAC.

In response to observations made by the reviewers, several adjustments were made in the process of data collection and logging that will help differentiate the assessment and review of the two programs in the future.

CURRICULAR CHANGES

Various constituencies provide inputs to the cycle of continuous improvement in the department. One of the areas where input is sought is in the area of the curriculum. Over the past several years, inputs from students, graduates, alumni, industrial advisors, and teachers have been collected. As data have been collected, the department executive committee, curriculum committee, and assessment committee have discussed with faculty ways to respond to data from the constituents. This year, several changes have been made to the curriculum--some changes are major, others are minor. This section documents these curricular adjustments.

SENIOR PROJECT

One area where change was needed and implemented was in the area of senior projects. Input from students (exiting seniors), graduates, and the department Industrial Advisory Committee were provided, and changes were carefully planned within the department.

Previously the senior project experience was a three semester (Design I, II and III) sequence begun in the junior year and was intended to be a major engineering design experience in which students utilized knowledge and skills developed across a multi-year broad-based undergraduate program. The old system was weak in the area of technical writing and communication.

The newly designed course sequence is as follows.

1. Formal technical writing class. Students are required to take English 3080. The ECE Department leadership met with the English Department leadership and created the English 3080: Introduction to Technical Communication course. Our students will now get a heavy dose of technical writing to prepare them to write technical reports, papers, proposals and to prepare and give formal presentations.
2. Engineering professionalism. The old Junior Design (Design I) course has been replaced with a new course on Engineering Professionalism. This course is taken in the junior year.
3. Engineering communications. This course takes the place of the old Design II and involves all of the technical writing for the students' particular projects.
4. Engineering design. This course takes the place of the old Design III. In this course students design and complete their projects.
5. Capstone courses. The department has added capstone courses which are laboratory intensive courses where students can, but are not required, to begin the design portion of their senior projects. The capstone courses in the department currently are as follows.
   a. ECE 5770: Computer Interfacing
   b. ECE 5340: Mobile Robots
   c. ECE 5240: Space Systems Design
   d. ECE 5930: Electro-Optics
   e. ECE 5930: Digital Radio

COMPUTER ENGINEERING

Two new computer engineering faculty members (Sanghamitra Roy and Koushik Chakraborty) joined the department during the academic year. One computer engineering faculty member (Alan Shaw) retired. With a net gain of one computer engineering faculty member, there was an opportunity to make some adjustments and additions to the computer engineering curriculum.

1. The VLSI sequence, taught by Dr. Roy, was redesigned with the first course (ECE 5/6460) being a VLSI CAD tools course and ECE 5/6470 being a VLSI design course.
2. A VLSI project course (ECE 7430) was added at the 7000 level.
3. Computer Architectures I (ECE 5750) was redesigned and an Architectures II (ECE 7720) course was added. These are being taught by Dr. Chakraborty.
4. Another adjustment made to the computer engineering curriculum was needed to complement the new and redesigned courses. ECE 3720: Introduction to Computer Engineering was promoted to ECE 5720. This course has been undergoing an extensive evolution over recent years under the direction of Dr. Brandon Eames, and it has now reached a steady-state. The course number promotion is in response to adjustments in the course material and also to enable both seniors and first-year graduate students to take the course. The new course, ECE 5720, is a prerequisite to ECE 5780: Real-time Systems and to Dr. Chakraborty's ECE 5750 course.
5. After recommendations from several constituents and a close examination by Dr. Fon Brown, the ECE 3710 course was redesigned around a new hardware platform (8051 microcontroller).

ELECTRICAL ENGINEERING

Only one significant change was made to the electrical engineering curriculum, and it was at the graduate level. Incoming graduate students who wanted to study signal processing and/or communication systems were unwilling to register for the three foundational courses (ECE 5630, ECE 6010, ECE 6030) in that discipline because of the perception of an impossibly high work load when those courses were taken together. Advising by faculty mentors

did not change students' perceptions or actions. Therefore, the semester in which three of the graduate courses were offered was adjusted. First, as a direct response to the students' concerns, ECE 6030: Mathematical Methods and Algorithms for Signal Processing was shifted from the fall to the spring semester. In response to that change, ECE 7670: Error Correction Coding and ECE 7030: Detection and Estimation Theory were moved from the spring semester to the fall semester since they both require ECE 6030 as prerequisites.

ON-LINE SYSTEM FOR DATA COLLECTION

One of the roles of the assessment committee is collecting large amounts of assessment data each semester and year. Each course has a course assessment filled out by the instructor after the end of the semester in which the course is taught. It has been observed that the sort of information pooled together in this assessment is observed over wide temporal window. It is difficult for instructors to keep all of this in their head until the point of assessment which occurs after the semester is over. For example, one of the things asked for relates to the preparation of the students at the beginning of the course. Instructors must recall such information. Other information available at the end of the course is more readily recalled.

The assessment committee felt the time was ripe for an on-line assessment data collection tool. This tool would work with e-mail reminders and web forms to inform instructors and gather information. In the new system, e-mail notices will remind instructors to review the course outcomes as they are preparing for their classes before a semester begins. A customized link will take them to a web site for their course where they can review the outcomes. Three to four weeks into the semester, an e-mail will remind them to respond to student preparation issues. At the end of the semester, they will be directed to a web form where other assessment data can be submitted. The system will continue to remind instructors until their assessments have been received. The on-line form will accumulate assessment information over time and across semesters and years. Formal reports will be able to be automatically generated from the data entered.

This system was designed at the end of the 2008-2009 academic year. It is currently under development and will be able to begin accepting information by December 2009 to capture course assessments for the fall semester 2009.

Once the system for the data collection process for course assessment has been completed, the next milestone will be to add a data collection process for the special assessments. These special assessments are filled out for every student in the electrical engineering and computer engineering programs. These targeted assessment tools measure the "a" through "k" program outcomes for all students. We hope to have this part of the system ready to accept data by the end of the Spring semester 2010.