Electrical and Electronic Engineering (EEE)
Undergraduate Program Assessment Report

During the academic year 2009/2010 the EEE Department changed the undergraduate program educational objectives based on recommendations from our ABET accreditation reviewer.

The new education objectives are as follows:

i. Core Knowledge: Our graduates will have careers in Electrical and Electronic engineering, or be engaged in a related career path.

ii. Application of Knowledge: Our graduates will apply their knowledge and skills to solve practical engineering problems.

iii. Life-long Learning: Our graduates will continue to develop their skills and seek knowledge after graduation in order to adapt to advancing technology and the needs of society. This may be indicated by the graduate’s pursuit of an advanced degree or other formal instruction, and/or that the graduate has developed a professional specialty.

iv. Professionalism: Our graduates will have the necessary professional skills, such as high ethical standards, effective oral and written communications, and teamwork, to be productive engineers and to advance in their careers.

One survey was conducted in spring of 2008, and another in spring 2009. ABET visited our department in fall 2009, and we developed the new educational objectives based on that visit. We then conducted another survey this spring (2010), mainly to see whether the new educational objectives were implemented successfully. Questions for all surveys were similar, but not the same. A large number of Alumni did not respond to the spring 2010 survey because of the surveys distributed in the past couple of years. We acknowledge that those numerous surveys probably resulted in a rather low response this year. We will distribute this survey to employers and faculty in the fall semester for comparison. Our baseline for both surveys was 70%.

The 2010 Alumni Survey shows that 75% of the alumni are currently employed with a career in Electrical Engineering (i). This number clearly surpasses our baseline, and in a time of recession we see this percentage as a great success. In the 2008 Alumni Survey for the EEE Program, 80.81% of respondents said they are currently employed as an engineer (i). The year 2008 was a tough economical year as well, and we are pleased to see the number of alumni employed is exceeding the baseline. An even greater number responded in 2010. They are currently employed as an engineer (i); 100% percent answered this question with yes, which is 8 out of 8 respondents.

In 2009, 66.7% said they were promoted within the past five years. In 2010, 87.50% of respondents said they have been promoted in the last five years (i). We regard that number as
unusually high, and view it as a sign that the EEE Program is highly successful in giving its students the core knowledge to succeed in an engineering career.

In 2008, 86.86% of alumni said the Electrical and Electronic Engineering Program helped them in an adequate to exceptional way to develop the ability to identify, formulate and solve engineering problems (ii). In 2010, 100% of all respondents said that they can apply their knowledge and skills to solve practical engineering problems (ii). This extremely high percentage indicates great programmal success when it comes to teaching EEE students how to apply their knowledge and skills to solve engineering problems. The number clearly surpasses our baseline of 70%.

In 2008, respondents also had to indicate how well the EEE Department helped them to recognize the importance of life-long learning and participation in professional societies (iii). Again, the baseline was surpassed, as 71.71% answered they had been adequately to exceptionally well prepared. The Alumni Survey 2010 also asked three questions regarding Educational Objective iii. One out of eight respondents (12.50%) said they have pursued a graduate degree since their graduation from CSUS (iii). We are pleased to see that students decided to further advance their education. In addition, 75% have pursued other educational opportunities such as workshops, conferences, lectures, professional societies, or studied on their own to advance their knowledge (iii). That is six out eight respondents, and the number is well above our baseline. We regard these results as highly positive. 87.50% of the alumni questioned for this survey said they think they developed necessary professional skills (iii), which is well above our baseline.

In 2008, 81.81% of students rated their ability to function effectively as part of a multi-disciplinary team to solve problems because of help by the EEE program as adequate to exceptional (iv).

In 2008, 80.80% of respondents said the program helped them to develop an understanding of professional and ethical responsibilities in an adequate to exceptional way (iv).

The EEE Program regards the results of the 2010 survey as a big accomplishment. The numbers indicate that most of the time the baseline is well surpassed, and oftentimes the numbers are showing an increase from previous surveys. We feel encouraged by the high numbers, and plan to conduct frequent surveys in the future in order to stay on task with the new EEE Educational Objectives.
EEE Program Graduate Assessment Process

I. General information about the program, e.g., data on students, faculty, staff, facilities, etc. (most of which is supplied by the Office of Institutional Research)

This section details data on students, faculty, staff and facilities. The major sources of information are
(1) the website maintained by, and fact books published by the CSUS Office of Institutional Research (OIR); and (2) the graduate website maintained by the EEE Department (http://www.ecs.csus.edu/eee/update08/students/grad/index.html). We have also included data on faculty expertise and department facilities in our ABET report submitted in Spring 2009.

The main requirements of the EEE graduate program are as follows:

1) Students should complete a total of 30 units which includes coursework and project/thesis work.
2) Students should specialize in at least two of the following five focus areas in Electrical Engineering: Power Systems, Communication Systems, Control Systems, Computer Architecture & Digital Design, and Microelectronic Design.
3) Students should select one faculty member as their primary advisor from their area of study, and each student needs to submit an advising form to the department at least once an academic year.

II. A statement of intended student learning outcomes at the program level; methods for assessing them, including the use of direct measures; assessment results to date; and documentation of the use of assessment results in effort to achieve program improvement (assistance with the preparation of which is available from the University Assessment Coordinator).

The EEE Department has developed a detailed and clear assessment plan for the B.S. program. Our M.S. program assessment plan will be modeled on our undergraduate assessment plan. The Department has the following student learning outcomes (SLO) at the program level:

1) A knowledge of mathematics
2) A knowledge of basic engineering
3) The ability to apply knowledge of mathematics, science and engineering to solve problems in E&EE
4) A knowledge of core E&EE topics
5) Depth in at least one area of E&EE out of Analog/Digital Electronics, Control Systems, Communications and Power.
6) The ability to use contemporary engineering techniques and tools for analysis and design
7) The ability to work with modern instrumentation, software and hardware, design and perform experiments, and analyze and interpret the results.
8) The ability to communicate effectively
9) An understanding of professional and ethical responsibility and a broad education to appreciate the impact of engineering solutions in the societal context
10) Recognition of the need for and an ability to engage in “life-long” learning.

III. The results of a focused inquiry addressing issues of particular interest/concern to the program itself, in the context of what is currently important to the college and university.

The focused inquiry for the graduate program Self-Study focuses on quality and goals of the culminating experience of the students. In the EEE graduate program we have the following three options for students:

1) Plan A or Thesis Option. This option requires students to complete a 5 unit research-level work under the supervision of a primary faculty advisor and two additional advisors.
2) Plan B or Project Option. This option requires students to complete a 2 unit project work under the supervision of a primary faculty advisor and one additional advisor.
3) Plan C or Comprehensive Exam option. This option requires students to take a comprehensive 4-hour exam after completion of the total graduate requirement of 30 units coursework.

The Culminating experience is a direct achievement measurement of the educational objectives of the program. The performance of students in the project/thesis or comprehensive exam is dependent on the training and learning obtained by students in the different courses. Specifically, the projects and theses are supervised by experienced and dedicated faculty in the five areas of specialization, and involve considerable effort in the execution of the projects and also to present a clear and high-quality project or thesis report. In the past, Project and Thesis work has resulted in patents, and publications in peer-reviewed conference proceedings and journals such as the IEEE (Institute of Electrical and Electronic Engineers) and IET (Institute of Engineering and Technology).

The EEE department will continue to improve the level of graduate project and thesis work, in tune with state-of-the-art industry and research areas of the outside world. The culminating experience is aimed at training our graduate students to contribute effectively in their continuing careers, either in higher research, such as a Ph.D. or in industry. Hence the department will provide specific measures to keep the quality of graduate projects and thesis at a high level.
IV Achievement of Program Outcomes

In this section we describe the processes to be used to assess the achievement of Student Learning Outcomes (SLOs) in the EEE program. Our ultimate goal is to utilize these assessment instruments to make ongoing improvements to our program. The EEE program performs outcomes assessment at two levels: Course and Program.

Processes Used to Assess Student Learning Outcomes are:

Course Level Assessment (Direct Measurement)

Course Embedded Assessment represents the “bricks and mortar” of our assessment program. Our experience shows that assignments and exams in individual courses provide immediate and valuable feedback to both the student and the faculty. Assignments and examinations including mid-terms and final are required in all courses. In addition, projects, Computer Aided Design and term papers are required in several classes as appropriate. They allow the faculty to identify any potential problems in related courses, i.e. if the performance of several students in a given exam or assignment indicates that they do not understand a concept they should have acquired in a prerequisite course, that probably indicates a problem with the related course.

We have established a Course Embedded Assessment (CEA) process that focuses on a set of core classes required of all students in our major. Each course has detailed objectives, specific course outcomes, and indicators that are monitored to ensure successful achievement of those outcomes. The Course Coordinators for courses covered by CEA present a report to the Department faculty reflecting on student achievement on the specific course outcomes and course topics, whether prerequisites are appropriate, student reaction to the course, and suggested changes if any.

This process is useful because it enables faculty who are not directly involved in specific courses from the CEA group to get a full understanding of the courses in the CEA group and make any adjustments to their own courses. It allows new faculty and part-time faculty to acquire a thorough understanding of the curriculum and become familiar with the challenges by perusing the annual CEA reports. Also, the process ensures that faculty in related courses interact with each other on a regular basis when preparing the CEA report for a particular course. Equally important, the CEA reports provide the documentation to illustrate how the faculty uses assessment results for ongoing program improvement.

For courses that are not part of the CEA group, individual faculty members who teach the course are responsible for course-level assessment. Each course has clearly defined objectives, a set of measurable outcomes, and contributes to one or more of the program’s Student Learning Outcomes. The faculty member teaching the course is responsible for reporting any major issues that are revealed from outcomes assessment and initiating appropriate changes to ensure that the course objectives are met successfully.
**Program Level Assessment (Indirect Measurement)**

Outcomes assessment at the program level is carried out by using a variety of assessment tools:

1. Student and alumni surveys reflecting on program outcomes.
2. Site visits to industry.
3. Independent assessment by Department-level Industry Representatives.
4. Feedback from College’s Industry Advisory Board.
5. Exit Interviews with graduating seniors

Since the faculty are primarily responsible for assessment, we use faculty surveys to set indicators as appropriate for our program outcomes. In some instances it is more appropriate to use qualitative indicators to assess success of a particular outcome (typically feedback and action items resulting from independent assessment by the Department’s Industry Representatives).

**Assessment Instruments**

We will use the following assessment instruments in our program:

**Surveys of Graduating Seniors:** Graduating seniors are surveyed at the time of graduation for their perceptions about the program’s educational objectives and student learning outcomes, our relative success in achieving those outcomes, and suggestions for improvement.

**Alumni Surveys:** Alumni from our program are surveyed three to five years out to rank the importance of each of our Program Educational Objectives and Student Learning Outcomes in the context of their current professional position and their level of preparation with respect to that objective or outcome.

**Industry Focus Teams Visits:** Faculty teams visit a company or industry that employs several graduates from our program to meet with a group of our alumni. Typically the alumni include recent graduates (1-5 years out), as well as experienced engineers and managers (6-10 years out, 11 years and over). A set of open-ended questions is distributed to the site prior to the visit to provide a foundation for the participants. The interviews are audio taped and placed on the Web for faculty review following the visit. A written transcript is also produced and shared with all faculty members. The reports are analyzed and action items with appropriate timelines are developed for implementation.

**Industry Liaison Council:** The EEE program enjoys a relationship with engineers from industry representing all major areas of emphasis in the EEE program. The program meets with industry representatives biannually and the industry representatives provide the program and the faculty with independent feedback on its efforts to achieve the Program Educational Objectives.

**Industry Advisory Board:** At the College level, the IAB receives reports from each program on a biannual basis and evaluates each program’s success in implementing the strategic
plan of the college. The IAB meets in executive session following the presentations and reports back to the Program Coordinators, Department Chairs and Deans with specific recommendations for follow up and action.

**Employer Surveys:** The College’s Career and Placement Office periodically surveys employers and provides salary information and relevant information on upcoming trends and opportunities to the programs.

**Exit Surveys:** Graduating students are surveyed.