2015-2016
Annual Assessment Report Template

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Report: BS Electrical and Electronic Engineering

Question 1: Program Learning Outcomes

Q1.1.
Which of the following Program Learning Outcomes (PLOs) and Sac State Baccalaureate Learning Goals (BLGs) **did you assess?** [**Check all that apply**]

- [ ] 1. Critical Thinking
- [ ] 2. Information Literacy
- [ ] 3. Written Communication
- [ ] 4. Oral Communication
- [ ] 5. Quantitative Literacy
- [ ] 6. Inquiry and Analysis
- [ ] 7. Creative Thinking
- [ ] 8. Reading
- [ ] 9. Team Work
- [ ] 10. Problem Solving
- [ ] 11. Civic Knowledge and Engagement
- [ ] 12. Intercultural Knowledge and Competency
- [ ] 13. Ethical Reasoning
- [ ] 14. Foundations and Skills for Lifelong Learning
- [ ] 15. Global Learning
- [ ] 16. Integrative and Applied Learning
- [ ] 17. Overall Competencies for GE Knowledge
- [ ] 18. Overall Competencies in the Major/Discipline
- [ ] 19. Other, specify any assessed PLOs not included above:

a. see below
b.
c.

Q1.2.
Please provide more detailed background information about **EACH PLO** you checked above and other information such as how your specific PLOs are **explicitly** linked to the Sac State BLGs:

Q1.2

The Program Learning Outcomes for the Department of Electrical and Electronic Engineering are the Student Outcomes (SOs) **required** by our accrediting agency, ABET (http://www.abet.org/). These are:

a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. an ability to function on multidisciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i. a recognition of the need for, and an ability to engage in life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

As required by our accrediting agency, ABET, the Student Outcomes (SOs) listed above are mapped to the Program Educational Objectives (PEOs). ABET requires that the PEOs be developed from the Sacramento State Mission Statement in consultation with the constituency of our program. The constituency of the EEE program includes the following: current students in the program, faculty in the EEE department, alumni, and industry (in particular, employers of our graduates). The current program educational objectives were adopted recently after revising the previous set of objectives, which were

drafted and approved in fall 2009. Prior to that, the program educational objectives were very similar to the student outcomes. The educational objectives have been discussed at the department level on several occasions in spring 2015. The feedback from the program constituencies was taken into account in the review process.
Feedback from constituencies is obtained mainly through surveys. During the current cycle, the Assessment Committee conducted several surveys of the students, alumni, faculty and industry to evaluate the program educational objectives. After the completion of the surveys, a meeting with the Industry Liaison Committee took place to discuss the PEOs and the survey results. Subsequently, the EEE Department faculty voted to adopt modifications to the PEOs.
The following section will show that the PEOs listed above are closely linked to the Sacramento State Baccalaureate Learning goals (BLGs). Because the PEOs are supported by the SOs, a connection between the SOs and the BLGs will be established.
The Current Program Educational Outcomes (PEOs) are:

1. **Core Knowledge:** Our graduates will have active careers in Electrical and Electronic engineering, or be actively engaged in a related career path.
2. **Application of Knowledge:** Our graduates will apply their knowledge and skills to solve practical engineering problems.
3. **Professionalism:** Our graduates will demonstrate the professional skills, such as high ethical standards, effective oral and written communications, and teamwork, necessary to be productive engineers and to advance in their careers.
4. **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.

The following section will show that the Student Outcomes (SOs) above can be mapped directly into the Sacramento State Baccalaureate Learning Goals (BLGs), which are:

1. **Competence in the Disciplines:** The ability to demonstrate the competencies and values listed below in at least one major field of study and to demonstrate informed understandings of other fields, drawing on the knowledge and skills of disciplines outside the major.
2. **Knowledge of Human Cultures and the Physical and Natural World** through study in the sciences and mathematics, social sciences, humanities, histories, languages, and the arts. Focused by engagement with big questions, contemporary and enduring.
3. **Intellectual and Practical Skills, Including**: inquiry and analysis, critical, philosophical and creative thinking, written and oral communication, quantitative literacy, information literacy, teamwork and problem solving, practiced extensively, across the curriculum, in the context of progressively more challenging problems, projects, and standards for performance.
4. **Personal and Social Responsibility, Including:** civic knowledge and engagement—local and global, intercultural knowledge and competence, ethical reasoning and action, foundations and skills for lifelong learning anchored through active involvement with diverse communities and real-world challenges.
5. **Integrative Learning, Including:** synthesis and advanced accomplishment across general and specialized studies.

It remains to show that the PEOs correspond to the BLGs. Below, each BLG will be linked to the PEOs that support it.

1. **BLG 1 Competence in the Disciplines:** This BLG refers to the others which follow; hence, it is supported by two over-arching SOs, (a) and (e). **SO (a)** makes reference to the ability to apply foundational knowledge to the solution of problems, which is almost a definition of engineering. **SO (e)** refers to the identification and formulation of problems, which requires knowledge of context and constraints from other that a purely engineering perspective. Hence **SO (e)** demonstrates an informed understanding of other fields.
2. **BLG 2 Knowledge of Human Cultures and the Physical and Natural World:** Knowledge of the physical and natural world is supported by **SO (a)**. Knowledge of human cultures is supported by **SO (h)**. Engineers design and build devices or systems, small and large, that are meant to address a societal need. Students draw upon general education courses and address possible impacts of their projects. **SO (d)** is relevant to this BLG also because students work on teams that comprise diverse student backgrounds.
3. **BLG 3 Intellectual and Practical Skills:** This BLG is supported by **SOs (b), (c), (d) and (g)**. The ability to design experiments and analyze and interpret data requires WASC core competencies critical thinking, quantitative literacy, information literacy, and creative thinking. The ability to design a system to meet needs within constraints requires inquiry and analysis and problem solving. The ability to work on teams requires teamwork. The ability to communicate effectively touches upon all aspects of the design process and includes written communication, oral communication, and reading.
4. **BLG 4 Personal and Social Responsibility:** This BLG is supported by **SOs (c), (f), (h) and (i)**. System design constraints listed in **SO (c)** include environmental, social, political, ethical, health and safety and sustainability. This involves WASC core competency civic knowledge and engagement. **SO (f)** includes ethical reasoning. **SO (h)** involves intercultural knowledge and competence and global learning. SO(i) addresses foundations and skills for lifelong learning.
5. **BLG 5 Integrative Learning:** This BLG is supported by **SOs (a), (c), (e) and (k).** As stated in the BLG, this category includes the application of multiple skills as needed to address a particular complex problem.

Q1.2.1.
Do you have rubrics for your PLOs?

- (●) 1. Yes, for all PLOs
- ( ) 2. Yes, but for some PLOs
- ( ) 3. No rubrics for PLOs
- ( ) 4. N/A
- ( ) 5. Other, specify:

Q1.3.
Are your PLOs closely aligned with the mission of the university?

- (●) 1. Yes

- ○ 2. No
- ○ 3. Don't know

Q1.4.
Is your program externally accredited (other than through WASC Senior College and University Commission (WSCUC))?

- ◉ 1. Yes
- ○ 2. No (skip to **Q1.5**)
- ○ 3. Don't know (skip to **Q1.5**)

Q1.4.1.
If the answer to Q1.4 is **yes**, are your PLOs closely aligned with the mission/goals/outcomes of the accreditation agency?

- ◉ 1. Yes
- ○ 2. No
- ○ 3. Don't know

Q1.5.
Did your program use the *Degree Qualification Profile* (DQP) to develop your PLO(s)?

- ○ 1. Yes
- ○ 2. No, but I know what the DQP is
- ◉ 3. No, I don't know what the DQP is
- ○ 4. Don't know

Q1.6.
Did you use action verbs to make each PLO measurable?

- ◉ 1. Yes
- ○ 2. No
- ○ 3. Don't know

(**Remember**: Save your progress)

Question 2: Standard of Performance for the Selected PLO

Q2.1.
Select **ONE(1)** PLO here as an example to illustrate how you conducted assessment (be sure you *checked the correct box* for this PLO in Q1.1):

Select PLO from list

Q2.1.1.
Please provide more background information about the **specific PLO** you've chosen in Q2.1.

Students have the opportunity to work in teams or with lab partners in several required and elective courses including EEE 174, EEE 108L, EEE 143 and EEE 109. However, senior design is the major course where the students have a great opportunity to work together and practice team work in an environment that is very similar to industry. In senior design, the students have to plan out the project by developing the work breakdown structure to divide work and the Gantt chart to track the project progress. Each team should have a team leader. This role is rotated so that every team member has the opportunity to serve as a team leader once in the two semester course sequence.
Since the students work in teams, conflict may arise. Students are instructed to resolve conflicts as soon as they arise. If the students are not successful, they bring the issue to the attention of the instructor. The instructor works with the students to resolve the conflict but if the conflict persists, the group may be split or group membership may be changed.
One senior design track combines EEE and CpE students (EEE 193A/CPE 190 and EEE 193B/CPE 191). Almost all the senior design projects in EEE 193A/CPE 190 and EEE 193B/CPE 191 have both hardware and software components. Teams of mixed computer and electrical engineering students have complementary skills in terms of the background as well as the hardware and software knowledge and capabilities. Computer engineering students have strong background in programming and software design, operating systems, networks, interfacing, and microprocessors. Electrical engineering students have strong background in circuit design, sensors, communications, and microcontrollers. Teams with complementary skills are typically more effective in tackling broad problems such as those addressed in senior design.

Q2.2.
Has the program developed or adopted **explicit** standards of performance for this PLO?

- ◉ 1. Yes
- ○ 2. No
- ○ 3. Don't know
- ○ 4. N/A

Q2.3.
Please **provide the rubric(s)** and **standards of performance** that you have developed for this PLO here or in the appendix.

EEE193A Rubric.docx
16.95 KB

No file attached

Q2.4. PLO	Q2.5. Stdrd	Q2.6. Rubric	Please indicate where you have published the **PLO**, the **standard** of performance, and the **rubric** that was used to measure the PLO:
☑	☐	☐	1. In **SOME** course syllabi/assignments in the program that address the PLO
☐	☐	☐	2. In **ALL** course syllabi/assignments in the program that address the PLO
☐	☐	☐	3. In the student handbook/advising handbook
☐	☐	☐	4. In the university catalogue
☐	☐	☐	5. On the academic unit website or in newsletters
☐	☐	☐	6. In the assessment or program review reports, plans, resources, or activities
☐	☐	☐	7. In new course proposal forms in the department/college/university
☐	☐	☐	8. In the department/college/university's strategic plans and other planning documents
☐	☐	☐	9. In the department/college/university's budget plans and other resource allocation documents
☐	☐	☐	10. Other, specify:

Question 3: Data Collection Methods and Evaluation of Data Quality for the Selected PLO

Q3.1.
Was assessment data/evidence **collected** for the selected PLO?

- (●) 1. Yes
- ( ) 2. No (skip to **Q6**)
- ( ) 3. Don't know (skip to **Q6**)
- ( ) 4. N/A (skip to **Q6**)

Q3.1.1.
How many assessment tools/methods/measures **in total** did you use to assess this PLO?
2

Q3.2.
Was the data **scored/evaluated** for this PLO?

- (●) 1. Yes
- ( ) 2. No (skip to **Q6**)
- ( ) 3. Don't know (skip to **Q6**)
- ( ) 4. N/A (skip to **Q6**)

Q3.2.1.

Please describe how you collected the assessment data for the selected PLO. For example, in what course(s) or by what means were data collected:

The assessment of team work in EEE193A/B combines two different methods:
• Assessment by the instructor using course rubric.
• Team member evaluation: the assessment uses the results of team member evaluation
The assessment results of senior design courses show that outcome (d) is below the threshold in several components

(**Remember**: Save your progress)

Question 3A: Direct Measures (key assignments, projects, portfolios, etc.)

Q3.3.
Were direct measures (key assignments, projects, portfolios, course work, student tests, etc.) used to assess this PLO?

- (●) 1. Yes
- ( ) 2. No (skip to **Q3.7**)
- ( ) 3. Don't know (skip to **Q3.7**)

Q3.3.1.
Which of the following direct measures were used? [**Check all that apply**]

- [x] 1. Capstone project (e.g. theses, senior theses), courses, or experiences
- [ ] 2. Key assignments from required classes in the program
- [ ] 3. Key assignments from elective classes
- [ ] 4. Classroom based performance assessment such as simulations, comprehensive exams, or critiques
- [ ] 5. External performance assessments such as internships or other community-based projects
- [ ] 6. E-Portfolios
- [ ] 7. Other Portfolios
- [ ] 8. Other, specify:

Q3.3.2.
Please **explain** and **attach** the direct measure you used to collect data:

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Q3.4.
What tool was used to evaluate the data?

- ( ) 1. **No** rubric is used to interpret the evidence (skip to **Q3.4.4.**)
- (●) 2. Used rubric developed/modified by the faculty who teaches the class (skip to **Q3.4.2.**)
- ( ) 3. Used rubric developed/modified by a group of faculty (skip to **Q3.4.2.**)
- ( ) 4. Used rubric pilot-tested and refined by a group of faculty (skip to **Q3.4.2.**)
- ( ) 5. The VALUE rubric(s) (skip to **Q3.4.2.**)
- ( ) 6. Modified VALUE rubric(s) (skip to **Q3.4.2.**)
- ( ) 7. Used other means (Answer **Q3.4.1.**)

Q3.4.1.

If you used other means, which of the following measures was used? [**Check all that apply**]

- [ ] 1. National disciplinary exams or state/professional licensure exams (skip to **Q3.4.4.**)
- [ ] 2. General knowledge and skills measures (e.g. CLA, ETS PP, etc.) (skip to **Q3.4.4.**)
- [ ] 3. Other standardized knowledge and skill exams (e.g. ETC, GRE, etc.) (skip to **Q3.4.4.**)
- [ ] 4. Other, specify: _____ (skip to **Q3.4.4.**)

Q3.4.2.
Was the **rubric** aligned directly and explicitly **with the PLO**?

- (•) 1. Yes
- ( ) 2. No
- ( ) 3. Don't know
- ( ) 4. N/A

Q3.4.3.
Was the **direct measure** (e.g. assignment, thesis, etc.) aligned directly and explicitly **with the rubric**?

- (•) 1. Yes
- ( ) 2. No
- ( ) 3. Don't know
- ( ) 4. N/A

Q3.4.4.
Was the **direct measure** (e.g. assignment, thesis, etc.) aligned directly and explicitly **with the PLO**?

- (•) 1. Yes
- ( ) 2. No
- ( ) 3. Don't know
- ( ) 4. N/A

Q3.5.
How many faculty members participated in planning the assessment data **collection** of the selected PLO?

2

Q3.5.1.
How many faculty members participated in the **evaluation** of the assessment data for the selected PLO?

7 (including assessment comm…

Q3.5.2.
If the data was evaluated by multiple scorers, was there a norming process (a procedure to make sure everyone was scoring similarly)?

- ( ) 1. Yes
- ( ) 2. No
- (•) 3. Don't know
- ( ) 4. N/A

Q3.6.
How did you **select** the sample of student work (papers, projects, portfolios, etc.)?

All student groups were evaluated

Q3.6.1.
How did you **decide** how many samples of student work to review?
we had time to evaluate all so we did.

Q3.6.2.
How many students were in the class or program?
approximately 30 in the class

Q3.6.3.
How many samples of student work did you evaluated?
six groups

Q3.6.4.
Was the sample size of student work for the direct measure adequate?

- 1. Yes
- 2. No
- 3. Don't know

(**Remember**: Save your progress)

Question 3B: Indirect Measures (surveys, focus groups, interviews, etc.)

Q3.7.
Were indirect measures used to assess the PLO?

- 1. Yes
- 2. No (skip to **Q3.8**)
- 3. Don't Know (skip to **Q3.8**)

Q3.7.1.
Which of the following indirect measures were used? [**Check all that apply**]

- 1. National student surveys (e.g. NSSE)
- 2. University conducted student surveys (e.g. OIR)
- 3. College/department/program student surveys or focus groups
- 4. Alumni surveys, focus groups, or interviews
- 5. Employer surveys, focus groups, or interviews
- 6. Advisory board surveys, focus groups, or interviews

☐ 7. Other, specify:

Q3.7.1.1.
Please explain and attach the indirect measure you used to collect data:

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Q3.7.2.
If surveys were used, how was the sample size **decided**?

Q3.7.3.
If surveys were used, how did you **select** your sample:

Q3.7.4.
If surveys were used, what was the response rate?

Question 3C: Other Measures (external benchmarking, licensing exams, standardized tests, etc.)

Q3.8.
Were external benchmarking data, such as licensing exams or standardized tests, used to assess the PLO?

- ○ 1. Yes
- ◉ 2. No (skip to **Q3.8.2**)
- ○ 3. Don't Know (skip to **Q3.8.2**)

Q3.8.1.
Which of the following measures was used? [**Check all that apply**]

- ☐ 1. National disciplinary exams or state/professional licensure exams
- ☐ 2. General knowledge and skills measures (e.g. CLA, ETS PP, etc.)

- [ ] 3. Other standardized knowledge and skill exams (e.g. ETC, GRE, etc.)
- [ ] 4. Other, specify:

Q3.8.2.
Were other measures used to assess the PLO?

- ( ) 1. Yes
- (•) 2. No (skip to **Q4.1**)
- ( ) 3. Don't know (skip to **Q4.1**)

Q3.8.3.
If other measures were used, please specify:

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(**Remember**: Save your progress)

Question 4: Data, Findings, and Conclusions

Q4.1.
Please provide simple tables and/or graphs to summarize the assessment data, findings, and conclusions for the selected PLO for **Q2.1**:

Outcome assessed	Course and semester	Meet expectations	Below expectations
(d)	EEE 193B, Spring 2012	68.18%	31.82%
	EEE 193B, Spring 2013	73.68%	26.32%
	EEE 193A, Fall 2014	72.22%	27.78%
(f)	EEE 193B, Spring 2012	72.73%	27.27%
	EEE 193B, Spring 2013	68.42%	31.58%
	EEE 193B, Spring 2014	71.87%	28.13%

These assessment results were presented to the assessment committee and to the EEE faculty during a faculty meeting by the EEE 193A and EEE 193B course coordinator. Team work results were discussed and evaluated. The results were below the threshold and therefore actions needed to be made to address the issue. Two actions have been taken to close the loop: (1) Team work has been added in ENGR 96A (interdisciplinary topics in engineering) as a major

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Q4.2.
Are students doing well and meeting the program standard? If not, how will the program work to improve student performance of the selected PLO?

The assessment results of Table 4.22 were presented to the assessment committee and to the EEE faculty during a faculty meeting by the EEE 193A and EEE 193B course coordinator. Team work results were discussed and evaluated. The results were below the threshold and therefore actions needed to be made to address the issue. Two actions have been taken to close the loop:
• Team work has been added in ENGR 96A (interdisciplinary topics in engineering) as a major requirement in the class,
• A lecture about teamwork has been introduced in senior design (EEE 193A/CPE 190).
Team work in ENGR 96A (Interdisciplinary Topics in Engineering): This is an experimental introductory engineering course required for electrical and computer engineering freshmen students. Considerable numbers of transfer students also take it. Team work has been added as a major component in ENGR 96A starting in fall 2014 in order to address the issues observed in EEE 193A/CPE 190 and EEE 193B/CPE 191 with team work. Students in ENGR 96A work on three group assignments. Team members are chosen randomly by the instructor for every group assignment. Therefore, each student works with nine different students in general. Team member evaluation is completed for at least one project. ENGR 96A also included a lecture about teamwork. A course change proposal form for ENGR 1, which will replace ENGR 96A, has been approved by the EEE department curriculum committee. The catalog description of ENGR 1 clearly includes teamwork.
Lectures on team work: Starting in fall 2013, a lecture about teams and team work has been added in senior design (EEE 193A). The lecture includes the following topics:
64
• Team definition
• Characteristics of effective teams and team member role.
• Team development stages: the Tuckman model
• Conflict resolution techniques
• Team decision making
The assessment committee continues to closely monitor team work to assess the effectiveness of the feedback actions being implemented and identify possible additional actions to improve all aspects of teamwork.

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Q4.3.
For the selected PLO, the student performance:

- 1. **Exceeded** expectation/standard
- 2. **Met** expectation/standard
- 3. **Partially** met expectation/standard
- 4. Did not meet expectation/standard
- 5. No expectation/standard has been specified
- 6. Don't know

Question 4A: Alignment and Quality

Q4.4.
Did the data, including the direct measures, from all the different assessment tools/measures/methods directly align with the PLO?

- 1. Yes
- 2. No
- 3. Don't know

Q4.5.
Were **all** the assessment tools/measures/methods that were used good measures of the PLO?

- 1. Yes
- 2. No
- 3. Don't know

Question 5: Use of Assessment Data (Closing the Loop)

Q5.1.
As a result of the assessment effort and based on prior feedback from OAPA, do you anticipate *making any changes* for your program (e.g. course structure, course content, or modification of PLOs)?

- 1. Yes
- 2. No (skip to **Q5.2**)
- 3. Don't know (skip to **Q5.2**)

Q5.1.1.

Please describe *what changes* you plan to make in your program as a result of your assessment of this PLO. Include a description of how you plan to assess the impact of these changes.

Changes already made are described above.
Assessment should include the very same measurement process used to produce the original results in order to make a fair comparison. At the same time, the method of collecting assessment data, including the rubric, will be evaluated. Perhaps the original measurement process and the refined process can be implemented together to allow both comparison with original results and comparison with a new, refined process.

Q5.1.2.
Do you have a plan to assess the *impact of the changes* that you anticipate making?

- ○ 1. Yes
- ◉ 2. No
- ○ 3. Don't know

Q5.2.

How have the assessment data from the last annual assessment been used so far? [**Check all that apply**]	1. Very Much	2. Quite a Bit	3. Some	4. Not at All	5. N/A
1. Improving specific courses	○	○	◉	○	○
2. Modifying curriculum	○	◉	○	○	○
3. Improving advising and mentoring	○	○	○	◉	○
4. Revising learning outcomes/goals	○	○	◉	○	○
5. Revising rubrics and/or expectations	○	○	○	◉	○
6. Developing/updating assessment plan	○	○	◉	○	○
7. Annual assessment reports	○	○	◉	○	○
8. Program review	◉	○	○	○	○
9. Prospective student and family information	○	○	○	◉	○
10. Alumni communication	○	○	◉	○	○
11. WSCUC accreditation (regional accreditation)	○	○	○	◉	○
12. Program accreditation	◉	○	○	○	○
13. External accountability reporting requirement	○	○	○	○	◉
14. Trustee/Governing Board deliberations	○	○	○	○	◉
15. Strategic planning	○	○	○	◉	○
16. Institutional benchmarking	○	○	◉	○	○
17. Academic policy development or modifications	○	○	◉	○	○
18. Institutional improvement	○	○	○	○	◉
19. Resource allocation and budgeting	○	○	○	◉	○
20. New faculty hiring	○	○	○	◉	○
21. Professional development for faculty and staff	○	○	○	◉	○
22. Recruitment of new students	○	○	○	◉	○

23. Other, specify:

Q5.2.1.
Please provide a detailed example of how you used the assessment data above:

Improvement of outcome (f)

Outcome (f) is assessed using the ethics quiz administered in senior design. This outcome has been monitored since spring 2012. Table ** shows the assessment results of outcome (f) for EEE 193B in the last three years. The attainment of outcome (f) was below the threshold in both the mid-cycle average (70.57% of students are above the threshold) and in the 2013-2014 academic year (73.85%of students are above the threshold). The results from the alumni survey are in the same range approximately. Several actions have been made to improve this outcome. Starting spring 2013 two additional lectures about engineering ethics have been added in senior design (EEE 193B). The lectures are well structured and include comprehensive topics about engineering ethics. They cover the following topics

- Moral theories
- Factual and conceptual issues
- Line drawing for solving ethical issues
- Bribery and accepting gifts
- Risk, safety and accidents
- Proprietary information
- Competitive bidding
- Whistle blowing
- The fundamental cannons

The same lectures have been adopted by EEE 192B. The assessment results from spring 2013 and spring 2014 did not show any improvement in the student attainment of outcomes (f). The issue was discussed again by the assessment committee in fall 2014. The assessment committee noticed that the ethics quiz grade was not included in the overall grade of the course. Therefore, it was possible that the low attainment was due to the fact that students did not give enough attention to the ethics lectures or the quiz. The assessment committee proposed to assign a weight to the ethics quiz. Therefore, the following action was suggested: a weight of 5% is assigned to the ethics quiz in EEE 193B starting in spring 2015. No weight is assigned in EEE 192B. The goal is to assess the effect of the weight by comparing the results of EEE 192B and EEE193B. Engineering ethics is also covered in ENGR 96A. The assessment results from spring 2015 of outcome (f) are shown in Table 4.25 for EEE 192B and EEE 193B.

Course	Meet expectations	Below expectations
EEE 192B	60.61%	39.39%
EEE 193B	82.35%	17.65%

Table 4.25: Assessment of outcome (f) for EEE 192B and EEE 193B in spring 2015.

The assessment results of outcome (f) for EEE 192B are comparable to those of Table 4.22 and fall below the threshold. The results are substantially improved in EEE 193B. These results were presented to the assessment committee on 06/05/2015. The assessment committee agreed unanimously to recommend that this ethics quiz be counted towards students' grades in all senior project classes going forward.

(**Remember**: Save your progress)

Additional Assessment Activities

Q6.
Many academic units have collected assessment data on aspect of their program *that are not related to the PLOs* (i.e. impacts of an advising center, etc.). **If** your program/academic unit has collected data on program *elements*, please briefly report your results here:

No file attached No file attached

Q7.
What PLO(s) do you plan to assess next year? [**Check all that apply**]

- [ ] 1. Critical Thinking
- [ ] 2. Information Literacy
- [ ] 3. Written Communication
- [ ] 4. Oral Communication
- [ ] 5. Quantitative Literacy
- [ ] 6. Inquiry and Analysis
- [ ] 7. Creative Thinking
- [ ] 8. Reading

- [ ] 9. Team Work
- [ ] 10. Problem Solving
- [ ] 11. Civic Knowledge and Engagement
- [ ] 12. Intercultural Knowledge and Competency
- [ ] 13. Ethical Reasoning
- [ ] 14. Foundations and Skills for Lifelong Learning
- [ ] 15. Global Learning
- [ ] 16. Integrative and Applied Learning
- [ ] 17. Overall Competencies for GE Knowledge
- [ ] 18. Overall Competencies in the Major/Discipline
- [ ] 19. Other, specify any PLOs not included above:

a.
b.
c.

Q8. Please attach any additional files here:

EEE_Assessment_Plan_APPROVED_2013-04-03.docx
64.16 KB

No file attached | No file attached | No file attached

Q8.1.
Have you attached any files to this form? If yes, please list every attached file here:

EEE Department Assessment Plan.

This plan will be revised to stress _program assessment_ using performance indicators. This approach is suggested by ABET. Attached is the assessment plan in effect up to the ABET visit last year.

Program Information (**Required**)

P1.
Program/Concentration Name(s): [by degree]

BS Electrical and Electronic Engineering

P1.1.
Program/Concentration Name(s): [by department]

Select...

P2.
Report Author(s):

Thomas Matthews

P2.1.
Department Chair/Program Director:

Thomas Matthews

P2.2.
Assessment Coordinator:

EEE assessment committee - Prof. Fethi Belkhouche, chair

P3.
Department/Division/Program of Academic Unit

Electrical & Electr. Eng.

P4.
College:

College of Engineering and Computer Science

P5.
Total enrollment for Academic Unit during assessment semester (see Departmental Fact Book):
433 computer engineering is a se

P6.
Program Type:

- (●) 1. Undergraduate baccalaureate major
- ( ) 2. Credential
- ( ) 3. Master's Degree
- ( ) 4. Doctorate (Ph.D./Ed.D./Ed.S./D.P.T./etc.)
- ( ) 5. Other, specify:

P7. Number of **undergraduate degree programs** the academic unit has?
1

P7.1. List all the names:
Bachelor of Science in Electrical and Electronic Engineering

P7.2. How many concentrations appear on the diploma for this undergraduate program?
N/A

P8. Number of **master's degree programs** the academic unit has?
1

P8.1. List all the names:
Master of Science in Electrical and Electronic Engineering

P8.2. How many concentrations appear on the diploma for this master's program?
N/A

P9. Number of **credential programs** the academic unit has?
0

P9.1. List all the names:

P10. Number of **doctorate degree programs** the academic unit has?

0

P10.1. List all the names:

When was your **assessment plan**...	1. Before 2010-11	2. 2011-12	3. 2012-13	4. 2013-14	5. 2014-15	6. No Plan	7. Don't know
P11. developed?	◉	○	○	○	○	○	○
P11.1. last updated?	○	○	○	◉	○	○	○

P11.3.
Please attach your latest **assessment plan**:

EEE_Assessment_Plan_APPROVED_2013-04-03.docx
64.16 KB

P12.
Has your program developed a **curriculum map?**

- ◉ 1. Yes
- ○ 2. No
- ○ 3. Don't know

P12.1.
Please attach your latest **curriculum map**:

120 Units Curriculum Map CSUS EE.xlsx
21.81 KB

P13.
Has your program indicated in the curriculum map where assessment **of student learning** occurs?

- ○ 1. Yes
- ◉ 2. No
- ○ 3. Don't know

P14.
Does your program have a capstone class?

- ◉ 1. Yes, indicate: EEE192 A/B OR EEE193 A/B
- ○ 2. No

- ○ 3. Don't know

P14.1.
Does your program have **any** capstone project?

- ◉ 1. Yes
- ○ 2. No
- ○ 3. Don't know

(**Remember**: Save your progress)

Assessment Rubric: Senior Design I

Course outcomes	Senior Design assignment to assess outcome	1 = Below expectation	2 = Meets expectation	3 = Exceeds expectation
Identify and evaluate a societal problem that needs an engineering solution	Societal problem	Student is not able to identify a societal problem that needs an engineering solution, or fails to evaluate or assess the societal problem	Student successfully identifies and discusses a contemporary societal problem that needs an engineering solution in some details, and provides evaluation supported by clear evidence from recent publications.	Student successfully identifies a contemporary societal problem that needs an engineering solution. A complete and clear evaluation of the problem is provided including current solutions and their impact. The evaluation is supported by clear evidence from recent publications.
Use basic project management methods and software tools such as Microsoft project for planning and management.	Work breakdown structure PERT and Gantt chart Continuous update of the Gantt chart	The work breakdown structure, PERT or Gantt chart does not reflect the project, some components of the project, or the relationship between components.	The work breakdown structure, PERT and Gantt chart reflect the deliverables, tasks, and the time line adequately. Project management software tools are used effectively and the Gantt chart is updated regularly.	Student employs industry standard project management techniques and processes in a highly effective way, the work breakdown structure, PERT and Gantt chart are detailed and complete. Project management software tools are used effectively and the Gantt chart is updated regularly.
Design a working laboratory prototype of a system/device/process that addresses a societal problem under realistic constraints such as cost and safety requirements.	Design idea Final demonstration Final report	The device/system does not satisfy the requirements specification, major features or components are not working properly according to requirements specification.	Design of a working laboratory prototype is successful and all major requirements are satisfied. Constraints such as cost and safety are taken into account and discussed.	The design satisfies all specifications, student began working on improving the design and moving it towards a deployable prototype. Constraints such as cost and safety are taken into account and discussed in details.
Communicate effectively in written and oral forms	Written assignments Weekly reports End of term documentation Oral presentations. Weekly meetings End of term presentation/demonstration	See communication rubric	See communication rubric	See communication rubric
Work effectively in a team.	Team leader evaluation Team member evaluation Instructor observations	Teammates have problems working together, team effectiveness is affected	Team members fulfill their roles and duties and are able to work effectively on the project.	The team is highly effective, teamwork goes very smoothly, issues and problems are unnoticed.

Assessment Plan

for
Electrical and Electronic Engineering

Approved by the EEE Faculty
on 4/3/2013

Processes Used by the EEE Department Faculty to Monitor and Assess the Achievement of Student Outcomes and Educational Objectives

Introduction

This report describes the processes now used by the EEE Department faculty to monitor and assess Student Outcomes (SO), and Educational Objectives (EO) – both of which have been established according to due process and the guidelines of ABET, the accrediting agency for our undergraduate programs. Student Outcomes are defined as that knowledge and those abilities that students should be able to demonstrate at the time of their graduation with the B.S. degree, and Educational Objectives are those professional characteristics that students should be able to demonstrate approximately 5 years after graduation. The processes are graphically summarized in Figure 1 (Student Outcomes) and Figure 2 (Educational Objectives) below.

Student Outcomes (SO)

Excerpted from ABET General Criteria 3 for Accreditation of Engineering Programs, 2013-2014

"The program must have documented student outcomes that prepare graduates to attain the program educational objectives. Student outcomes are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program. □
□

(a) an ability to apply knowledge of mathematics, science, and engineering □□
(b) an ability to design and conduct experiments, as well as to analyze and interpret data □
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability □□
(d) an ability to function on multidisciplinary teams □□
(e) an ability to identify, formulate, and solve engineering problems □□
(f) an understanding of professional and ethical responsibility □□
(g) an ability to communicate effectively □□
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context □□
(i) a recognition of the need for, and an ability to engage in life-long learning □□
(j) a knowledge of contemporary issues □□
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice."

Educational Objectives

The EEE Department Educational Objectives are:

I. Core Knowledge: Our graduates will have careers in electrical 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.

Course Level Assessment

We have established a quantitative Course Embedded Assessment (CEA) process that encompasses all of our classes, required as well as elective, graduate as well as undergraduate, which are included in the degree programs of our major students. Each University approved course in our curricula has specific course outcomes listed on the official ABET outline for the course. On an annual basis, the designated faculty Course Coordinators each present a report to the department faculty reflecting on student achievement with regard to the specific course outcomes of the courses for which they are responsible, and suggest changes, if any, that they feel need to be made in order to improve the achievement of those outcomes.

This process is very useful because it enables faculty who may not be directly involved in specific courses to get a better understanding of those courses, and learn about best-practice adjustments that they may make. It allows new faculty and part-time faculty to acquire a better understanding of the curriculum and become familiar with the challenges that it faces. Also, the process ensures that faculty teaching related courses in each area of the curriculum will 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 necessary to illustrate how the faculty are using quantitative assessment results for continuous program improvement.

The CEA process also includes indirect (qualitative) measures of student satisfaction with the quality of instruction and their achievement of the course outcomes through Student Evaluations of Teaching (SET) surveys. These surveys are conducted for each course in each semester that the course is offered.

Program Level Assessment

Outcome and objective assessment at the program level is carried out by using a variety of assessment tools:

1. Direct measurement via course embedded assessment, with course outcomes mapped to student outcomes
2. Student and alumni surveys reflecting on ABET specific program outcomes
3. Site visits to industry reflecting on the ABET program educational objectives
4. Qualitative feedback on the achievement of program outcomes and educational objectives from the department-level Industry Liaison Council (ILC)
5. Qualitative feedback from College's Industry Advisory Board (IAB)
6. Faculty surveys

In general, both direct (quantitative) and indirect (qualitative) assessment methods are used to monitor student outcomes. However, in some instances it is appropriate to rely on qualitative indicators, rather than or in preference to quantitative ones, to assess the achievement of a particular outcome (e.g. qualitative feedback and specific action items resulting from discussions by the Department's Industry Liaison Council or the College's Industry Advisory Board). The assessment of objectives is done entirely using indirect (qualitative) methods.

Assessment Instruments

In order to meet current ABET Engineering Criteria for accreditation with respect to assessment, we use the following assessment instruments in our programs:

Focused Assignments and Examinations: Assignments and examinations including midterm and final exams are required in all courses. In addition, projects, computer aided design (CAD) and term papers are required in several classes as appropriate. These form the basis for quantitative evaluation of course outcomes. An example rubric for the evaluation of course outcomes from assignments and examinations is shown below. Each course outcome is then mapped into a relevant ABET educational outcome and becomes part of the quantitative base for the assessment of that SO.

EEE (course number) Rubric for the Direct Assessment of Course Outcomes

Course Outcome	**Exceeds Expectations**	**Meets Expectations**	**Below Expectations**
1) Enter the first Course Outcome here	Enter how a student will perform if they exceed expectations for this outcome	Enter how a student will perform if they meet expectations for this outcome	Enter how a student will perform if they are below expectations for this outcome
2) Enter the second Course Outcome here	Enter how a student will perform if they exceed expectations for this outcome	Enter how a student will perform if they meet expectations for this outcome	Enter how a student will perform if they are below expectations for this objective
3) Enter the third Course Outcome here	Enter how a student will perform if they exceed expectations for this outcome	Enter how a student will perform if they meet expectations for this outcome	Enter how a student will perform if they are below expectations for this outcome
4) Enter the fourth Course Outcome here	Enter how a student will perform if they exceed expectations for this outcome	Enter how a student will perform if they meet expectations for this outcome	Enter how a student will perform if they are below expectations for this outcome
5) Enter the fifth Course Outcome here **(It is advisable to limit the number of course outcomes to 5 or less to ease data collection)**	Enter how a student will perform if they exceed expectations for this outcome	Enter how a student will perform if they meet expectations for this outcome	Enter how a student will perform if they are below expectations for this outcome

Surveys of Graduating Students: Graduating students are surveyed at the time of graduation for their perceptions about the how well they have achieved the program's educational outcomes, our relative success in delivering those outcomes, and suggestions for program improvement.

Alumni Surveys: the Office of Institutional Research (OIR) surveys Alumni from our program every three years. The survey questions include several that are directly related to the achievement of our Educational Objectives.

Site Visits: At the end of each semester, faculty teams visit a company that employs several graduates from our program in order to meet directly with a group of our alumni and their managers. 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 discussion with the participants. Specific questions related to the achievement of educational objectives are also given to the alumni. The interviews are recorded during the visit and placed on the Web for subsequent faculty review. A written transcript is also produced and shared with all faculty members. The Assessment and Accreditation Committee (AAC) of the department analyzes these results, and action items with appropriate timelines are developed for implementation.

Employer Surveys: The College's Career Planning and Placement Office periodically surveys

regional employers and provides us with salary data and relevant information concerning the professional growth trends and employment opportunities in our disciplines.

Industry Liaison Council: This is a department level council made up of engineers from industry representing all major areas of emphasis in the EEE program. The ILC meets biannually and provides 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 the Dean with specific recommendations for follow up and action.

Our ultimate goal is to utilize these various assessment instruments to make continuous improvements to our programs.

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. Problems specifically designed to assess the achievement of particular course outcomes allow the faculty to identify potential problems the students may be having in achieving those outcomes. If the performance of a significant number of students on a targeted exam problem or assignment indicates that they have not achieved a desired course outcome, it immediately triggers discussion among the faculty in the area of how to improve students' achievement of that particular course outcome. If the problem is seen to require broader interaction among the faculty of the department, the findings and recommendations of the area faculty are summarized by the Course Coordinator and then presented to the entire department faculty for action.

Indirect program level assessment in general provides us with a supplemental view of our educational outcomes and objectives, and of how well they are being achieved, from several different perspectives – that of our graduating students, our alumni, our advisory boards, the managers in industries that employ our graduates, and the faculty. The survey data from these constituencies are collected by the AAC, which then provides a periodic report and recommendations for improvement to the entire department faculty.

Graduate Level Assessment

Although ABET does not accredit our graduate programs, we follow similar ABET guidelines in their assessment. The student outcomes of the graduate program, however, have been redefined to be appropriate for graduate-level education. Both student outcomes and educational objectives are evaluated at the graduate-level using the same types of instruments as described above for our undergraduate assessment.

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

1) A knowledge of advanced mathematics
2) A knowledge of applied engineering
3) The ability to apply knowledge of mathematics, science and engineering to solve problems in E&EE
4) A knowledge of core and advanced 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

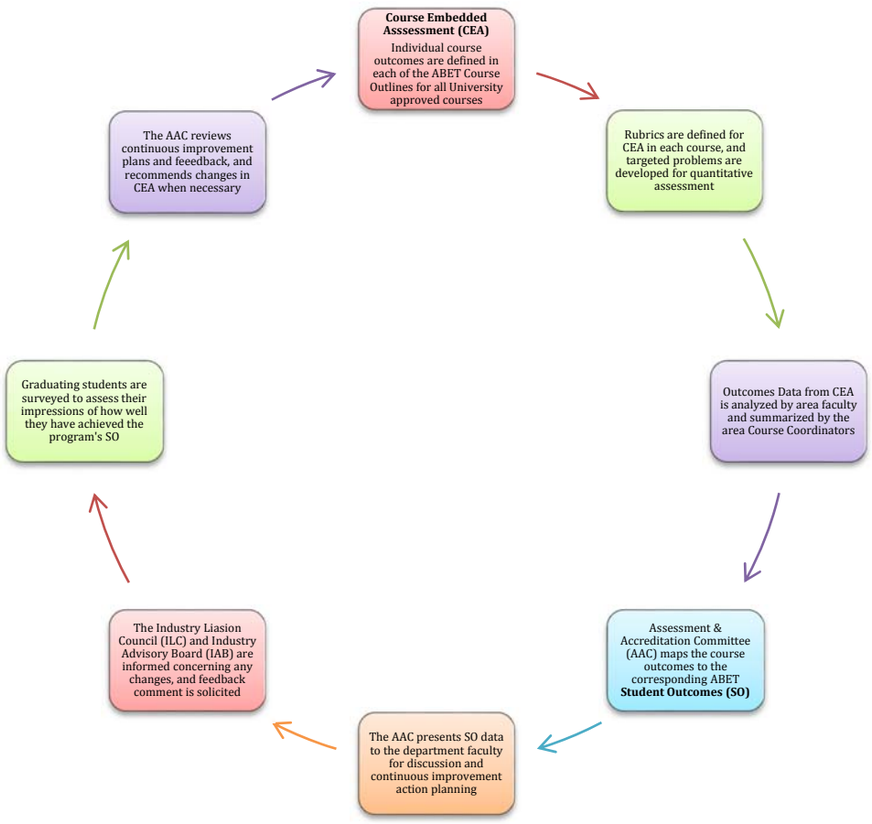


Figure 1: Flowchart of Student Outcomes assessment in Electrical & Electronic Engineering

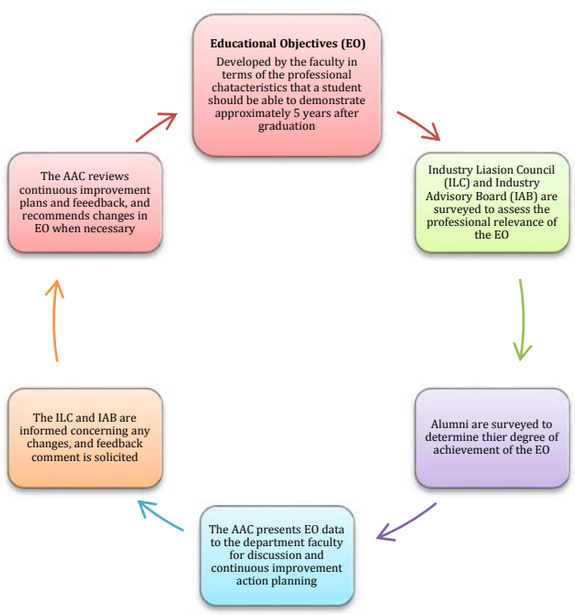


Figure 2: Flowchart of Educational Objectives assessment

in Electrical & Electronic Engineering

CSU 120/180 Units Curriculum Map

Campus: Sacramento

Degree (BA, BS…): BS

Major: Electrical and Electronic Engineering

Concentration:

Total units: 122

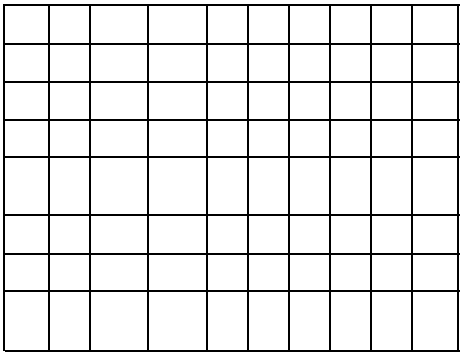
GE Area requirements double counted with major or other requirement: 12 A3, E, C,D

Please attach sheet detailing exceptions requested.

		All courses required for graduation →	ENGR1 - Introduction to engineering	Math 30 - Calculus I	Chem 1E Chemistry for Engineers	Engr 50 - Comp methods and App	Math 31 - Calculus II	Phys 11A - Gen Phys - Mechanics	EEE64 - Intro to Logic Design	Math 32 - Calculus III	Phys 11C - Gen Phys - Elec & Mag	Engr 17 - Circuit Analysis	Math 45 - Differntial Equations	EEE117 - Network Analysis (Circuits II)	EEE130 - Electromechanical Conversion	EEE161 - Applied Electromagnetics
		Number of Units →	1	4	4	3	4	4	4	4	4	3	3	4	3	4
Student Learning Outcomes (identify all required for accreditation, certification, or licensure)	**Accreditation Student Outcome A** Apply math, sci and engineering knowledge	Content Level → (Introduced, developed, mastered)		I	I		I	D	I	D	D	D	D	D	D	D
	Accreditation Student Outcome B Experiments, analyze and interpret data				I			I	I		D			D		D
	Accreditation Student Outcome C Design to meet needs within constraints								I			D				D
	Accreditation Student Outcome D Work in multidisciplinary teams			I	I		D	D		D	D	D	D	D		
	Accreditation Student Outcome E Identify, formulate, solve engineering problems		I					I				I		D	D	D
	Accreditation Student Outcome F Professional ethics		I													
	Accreditation Student Outcome G Communicate effectively		I	I	I			I	I					D		D
	Accreditation Student Outcome H Breadth for understanding engineering in many contexts		I												D	D
	Accreditation Student Outcome I Life long learning		I													
	Accreditation Student Outcome J Use modern engineering skills & tools for practice								I			D		D		D
Program Outcomes	**Program Outcome 1** Enter professional employment or graduate study in electrical and electronic engineering											I		D	D	D
	Program Outcome 2 Ause principles of science, math, and engineering to identify, formulate and solve electrical and electronic engineering problems			I	I		I	I	I		I	D	I	D	D	D
	Program Outcome 3 Apply creativity in design of systmens, components, processes, and/or experiments working in multidiscplinary teams								I			I				
	Program Outcome 4 Communicate effectively through speaking, writing, and graphics using appropriate technology			I	I		I	I	I		D	D				
	Program Outcome 5 Apply knowledge of professional, ethical, social responsibilities, diverse cultures and life long learning in professional career			I	I											
CSU GE Area A	**GE Area A1--Oral Communication** 3 units															
	GE Area A2--Written Communication 3 units															
	GE Area A3--Critical Thinking 3units			I	I		I	D			D	D				D
CSU GE Area B	**GE Area B1--Physical Science** 3units															
	GE Area B2 --Life Science 3units															
	GE Area B3--Laboratory Science (with B1 or B2 course) 3units															
	GE Area B4--Math/Quantitative Reasoning 3units															
CSU GE Area C	**GE Area C1--Arts, Cinema, Dance, Music, Theater** 3units															
	GE Area C2--Lit, Phil, Language (not English) 3units															
	GE Area C 3units															

	GE Area C 3units															
CSU GE Area D	**GE Area D** (Must be taken in more than one area) 3units															
	GE Area D (Must be taken in more than one area) 3units															
	GE Area D (Must be taken in more than one area) 3units															
	GE Area D (Must be taken in more than one area) 3units															
CSU GE Area E	**GE Area E** 3units															
American Institutions	**American Institutions: US History Constitution** Varying units															
	American Institutions: California and local gov. Varying units															

EEE 180 - Signals and Systems	EEE108 - Electronics I	EEE174 - Introduction to Microprocessors	EEE184 -Introduction to Feedback Systems	EEE109 - Electronics II OR EEE141 +EEE143	EEE185 - Modern communication systems	Engr120 - Probability and Random Signals	ENGR140 - Engineering Economics	EEE192A&B OR EEE193A&B Senior Design	Electives	Total Major Units
3	4	4	3	4	3	3	2	4	13	92
D	D	D	M	M	M	M		M		
	D	D		M		D		M		
	D	D	M	M	M	D	D	M		
		D		M				M		
D	D	D	M	M	M	D		M		
								M		
	D	D		M				M		
	D	D	M					M		
							D	M		
D	D	D	M	M		M		M		
D	D	D	M	M	M	M	D	M		
	D	D	M	M	M	M		M		
		D	M	M				M		
			D	M				M		
							D	M		
	D		M	M	M					



ELECTRIC & ELECTRONIC ENGINEERING BS – Cut off information

Q4.1

Outcome assessed	Course and semester	Meet expectations	Below expectations
(d)	EEE 193B, Spring 2012	68.18%	31.82%
	EEE 193B, Spring 2013	73.68%	26.32%
	EEE 193A, Fall 2014	72.22%	27.78%
(f)	EEE 193B, Spring 2012	72.73%	27.27%
	EEE 193B, Spring 2013	68.42%	31.58%
	EEE 193B, Spring 2014	71.87%	28.13%

These assessment results were presented to the assessment committee and to the EEE faculty during a faculty meeting by the EEE 193A and EEE 193B course coordinator. Team work results were discussed and evaluated. The results were below the threshold and therefore actions needed to be made to address the issue. Two actions have been taken to close the loop: (1) Team work has been added in ENGR 96A (interdisciplinary topics in engineering) as a major requirement in the class. (2) A lecture about teamwork has been introduced in senior design (EEE 193A/CPE 190).