Academic Program Review Report

Graduate Programs
College of Engineering and Computer Science
California State University, Sacramento

Review Team

Dr. Amy Liu, Review Team Co-Chair, Department of Sociology
Dr. Kimo Ah Yun, Review Team Co-Chair, Department of Communication Studies
Dr. Jana Noel, Department of Teacher Education
Dr. Kenneth Sprott, Department of Mechanical Engineering

External Consultants

Michael Ward, Ph. D.
External Consultant for Electrical, Computer, Civil and Mechanical Engineering
Dean, College of Engineering, Computer Science, and Construction Management
California State University, Chico
Chico, CA  95929-0003

Orlando Madrigal, Ph. D.
External Consultant for Computer Science and Soft Engineering
Professor, College of Engineering, Computer Science, and Construction Management
California State University, Chico
Chico, CA  95929-0003

October 2011
EXECUTIVE SUMMARY OF COMMENDATIONS AND RECOMMENDATIONS

Commendations to the College of Engineering and Computer Science

1. The review team commends the College of Engineering and Computer Science for serving as a valuable asset to the community by providing a curriculum that allows students to hold jobs in private companies and public agencies while simultaneously completing their graduate degree. The College’s effort is essential to the mission of the University.

2. The review team commends the College of Engineering and Computer Science for cultivating a strong support base through its Advisory Boards. This support is critical in these tough budget times.

3. The review team commends the College of Engineering and Computer Science for producing valued employees that are sought after by regional private companies, consulting firms, and public agencies.

4. The review team commends Dr. Emir J. Macari, Dean of the College of Engineering and Computer Science, and Dr. John Oldenburg, Special Assistant to the Dean, for their leadership and commitment to the engineering and computer science graduate programs and to the College’s program review and assessment efforts.

5. The review team commends the College of Engineering and Computer Science for working closely with the review team and for using the team’s suggestions to improve student assessment and learning. Some of this progress can be seen in the graduate programs’ January updates.

6. The review team commends the faculty and staff members for their hard work and commitment to the graduate programs and their students.

Recommendations to the College of Engineering and Computer Science

1. Think strategically about how to carry out program review and assessment for the six graduate programs in the College so that assessment activities will benefit student learning and success, promote these programs, and avoid undue stress for the faculty.

2. From this review cycle, it can be seen that great progress in program review and assessment has been made in some of the graduate programs. However, to move assessment to the next level and keep the effort sustainable, the College needs a great deal of help and support. Please seek help from the Office of Academic Program Assessment in developing a list of reasonable graduate learning outcomes and objectives that are most important to the College and are clearly different from the undergraduate
learning outcomes and objectives. Moreover, clearly articulate the direct connections among course learning outcomes, program learning outcomes, college/university learning outcomes, or national disciplinary standards such as ABET standards/trends.

3. Modify existing high quality rubrics, such as the VALUE rubrics, and use these to directly analyze graduate student work.

4. Use program review and assessment data to improve not only the student learning in a class, but also the graduate programs in the College. Use assessment results to make other important budgeting and planning decisions in the College as well.

5. Organize all of the above assessment efforts at the college level, and use technology to develop an electronic platform for assessment that serves the need of collection, selection, reflection, analysis, and reporting in the College.

6. Explore ways to better utilize the Industrial Advisory Board for more support.

7. Find ways to better utilize existing resources to enhance the efficiency of the curriculum, such as developing common core graduate courses for all graduate students at the College.

8. Explore creative ways to provide more sustainable support to all the graduate programs and their coordinators in the College.

9. Work closely with the Graduate Office and the University to provide better support for the College’s graduate admission so the graduate programs in the College can manage their graduate enrollment, especially the enrollment of the international students, more successfully.

10. Require departments to update their assessment plans to include assessment procedures for graduate programs.

11. Require departments to include their graduate program(s) in their annual university assessment report.

12. The Dean’s office should clearly stipulate the consequences if the departments fail to achieve satisfactory progress in their graduate assessment efforts.

Commendations to the graduate programs in Computer Science and Software Engineering

1. The review team commends the Department for its ability to successfully obtain significant grants.
2. The review team commends the Department for being recognized as one of the premier programs in computing in the CSU system.
3. The review team commends the Department for its continued scholarship efforts.

4. The review team commends the Department Chair and the Graduate Coordinator for their leadership and commitment to graduate program review and assessment.

5. The review team commends the faculty in the Department for their hard work in the graduate program review and assessment.

6. The review team commends the Department for developing an assessment plan that gets at the types of data that are necessary to understand what the students are learning.

7. The review team commends the Department for carefully constructing rubrics to evaluate the learning of graduate students.

8. The review team commends the Department for its efforts to “close the loop” with assessment data.

9. The review team commends the Department for engaging in and implementing strategies to improve the analysis efforts in the assessment process.

**Recommendations to the graduate programs in Computer Science and Software Engineering**

1. The assessment plan is only a “starting point” for the Department. Efforts need to be made to continue to retool and reconsider the assessment plan.

2. The assessment plan needs to better distribute data collection across the career of a graduate student by finding additional ways to collect assessment data at multiple points.

3. Find ways to provide students with more opportunities to improve their oral and written communication skills throughout the entire graduate program process.

4. Use program review and assessment data to improve not only student learning in a class, but also the graduate programs in the Department. Use the results of the assessment to make other important budgeting and planning decisions at the department and the program level as well.

5. The Department should make use of university resources, such as the University Assessment Coordinator, to assist the faculty in their future assessment efforts.
Commendations to the graduate programs in Electrical and Electronic Engineering (EEE) and Computer Engineering (CpE)

1. The review team commends the Department for offering an assessment plan that is the most ambitious among the three engineering departments.

2. The review team commends the Department for its serious approach to program assessment.

3. The review team commends the Department for developing a plan that includes both direct and indirect forms of evidence.

4. The review team commends the Department for its efforts to use assessment data to make class changes and enhance student learning.

Recommendations to the graduate programs in Electrical and Electronic Engineering (EEE) and Computer Engineering (CpE)

1. Given the ambitious assessment plan, it may be difficult to sustain it over a long period of time. Find ways to simplify the assessment plan so that it can be managed more easily and still accomplish the most important goals.

2. Reconsider the total number of learning outcomes. The presence of too many learning outcomes might hurt the programs by hiding what is most important for the Department.

3. Articulate the direct connections among course learning outcomes, program learning outcomes, college/university learning outcomes (once the University/the College has established them), or national disciplinary standards such as ABET standards/trends, as we have suggested for all the graduate programs in the College.

4. Create clear and meaningful rubrics to assess student learning and overall program quality. Clear rubrics will help standardize individual ratings and strengthen the recommendations that will derive from the collected data.

5. Consider ways to get graduate students more involved in the assessment of their graduate experience.

6. Use program review and assessment data to improve not only the student learning in a class, but also the two graduate programs in the Department. Make use of assessment results in other important budgeting and planning decisions at the department and the program level as well.

7. Use university resources, such as the University Assessment Coordinator, to assist in future assessment efforts.
**Commendations to the graduate program in Mechanical Engineering**

1. The review team commends the Department for maintaining its scholarly activity.

2. The review team commends the Department for having a proposed assessment plan that is appropriate for a graduate program.

3. The review team commends the Department for including direct and indirect assessment measures.

4. The review team commends the Department for having a narrowed and defined set of student learning outcomes.

**Recommendations to the graduate program in Mechanical Engineering**

1. The Department’s third learning outcome, which reads, “Demonstrate creativity in the design of systems, components, processes, and/or experiments and in the application of experimental results to independently address a focused research question” is difficult to assess. Consider altering attempts to “demonstrate creativity” to something more tangible or spend time developing an agreed upon rubric to make this item more objective.

2. Articulate the direct connections among course learning outcomes, program learning outcomes, college/university learning outcomes (once the University/the College has established them), or national disciplinary standards such as ABET standards/trends, as we have suggested for all the graduate programs in the College.

3. Develop rubrics carefully. How the Department chooses to measure assessment data will greatly impact the type and value of the data that will be collected.

4. Pay careful attention to the processes that the Department will use to “close the loop.” Make sure to use program review and assessment data to improve not only the student learning in a class, but also the graduate program in the Department. Make other important budgeting and planning decisions at the department and the program level as well.

5. Use university resources, such as the University Assessment Coordinator, to assist in future assessment efforts.

6. Continue to carry out the proposed surveys for the focused inquiry so the department can have better data for the three inquiry questions the Department proposed to study in its self-study proposal:

   1) How well does the curriculum and thesis/project component prepare students for industry employment or further graduate study?
2) How well does the content and structure of the program meet the workforce needs of the region and California?
3) How well does the content and structure of the program meet the needs of our faculty in maintaining fulfilling professional lives?

7. Continue to analyze the data and reflect on the results from the above three questions and come up with suggestions to improve student learning and the graduate curriculum.

**Commendations to the graduate program in Civil Engineering**

1. The review team commends the Department for its scholarly activity.

2. The review team commends the Department for its systematic and ongoing efforts to secure external funding for its program.

3. The review team commends the Department for providing flexibility in its scheduling so that working professionals can be served through evening courses.

4. The review team commends the Department for offering a graduate program that serves an important local population of practicing professionals.

**Recommendations to the graduate program in Civil Engineering**

1. A series of program learning outcomes needs to be created. These outcomes should have the capability to be measured prior to a student graduating and should mirror the educational objectives used by the Department.

2. Develop a systematic plan for assessing the student outcomes.

3. Build an assessment plan that is sustainable over time and leads to meaningful improvement in the curriculum.

4. Use university resources, such as the University Assessment Coordinator, to assist in future assessment efforts.

5. Conduct focus group interviews and alumni and graduate student surveys to find the answers to the three inquiry questions the Department proposed to study in its self-study proposal:

   1) How well does the graduate curriculum serve our professional community?
   2) What are the delivery methods that work effectively in achieving our graduate program educational objectives?
3) What makes our program attractive to the graduate students? How does our program affect our graduates?

6. Analyze the data and reflect on the results from the above three questions and come up with suggestions to improve student learning and the graduate curriculum.

**Recommendations to the Provost and the University**

1. We know the Provost has worked very closely with deans to provide some support for their assessment efforts, but this support should be increased. The review team encourages the Provost to expand this effort by supporting the use of technology for teaching and learning and for program review, assessment, and accreditation in this college.

2. The review team recommends the Provost consider launching more creative and efficient faculty development efforts in program review and assessment on the campus.

3. Improve communication of the best assessment practices and sample annual assessment reports on campus, including the posting of such practices on the campus website for easy access. This would be a relatively inexpensive, efficient, and effective means of allowing this college – and all others – to benefit from the institutional knowledge and experience that we have as a community.

4. Explore creative ways to provide more sustainable support to the graduate programs and their coordinators in the University.

5. Work closely with the Graduate Office and the College to provide better support for the College’s graduate admission so the graduate programs can manage their graduate enrollment, especially the enrollment of the international students, more successfully.

**Recommendations to the Faculty Senate**

1. The Faculty Senate needs to work closely with the faculty and the administration to clarify the purpose of the GRADUATE program reviews on this campus and explore the best ways to achieve the desired goal. These efforts will significantly facilitate the program review and assessment in the departments, the College, and the University.

2. Based on this program review and the Self-Study Reports prepared by the four departments at the College of Engineering and Computer Science, the review team recommends:

   1) The two master’s programs (Computer Science and Software Engineering) and the Certificates of Advanced Study in the Computer Science Program
at the Department of Computer Sciences be approved for six years or until the next scheduled program review.

2) The two master’s programs (Electrical and Electronic Engineering and Computer Engineering) at the Department of Electrical and Electronic Engineering be approved for six years or until the next scheduled program review.

3) The master’s program in Mechanical Engineering be approved for six years or until the next scheduled program review with an interim report due to Academic Affairs in March 2014 that satisfies both University and WASC requirements and provides appropriate data for the three questions in their focused inquiry. If a satisfactory interim report is not submitted, Academic Affairs will apply appropriate sanctions.

4) The master’s program in Civil Engineering be approved for six years or until the next scheduled program review with an interim report due to Academic Affairs in March 2014 that 1) satisfies both University and WASC requirements, 2) provides appropriate data for the three questions in their focused inquiry, and 3) includes a workable and fully implemented graduate assessment plan. If a satisfactory interim report is not submitted, Academic Affairs will apply appropriate sanctions.
INTRODUCTION

In February 2011, we reviewed the six graduate programs of the four departments in the College of Engineering and Computer Science (ECS):

1. Department of Computer Science
   1). Master of Science: Computer Science (CS)
   2). Master of Science: Software Engineering (SE)
2. Department of Electrical and Electronic Engineering
   3). Master of Science: Electrical and Electronic Engineering (EEE)
   4). Master of Science: Computer Engineering (CpE)
3. Department of Mechanical Engineering
   5). Master of Science: Mechanical Engineering (ME)
4. Department of Civil Engineering
   6). Master of Science: Civil Engineering (CE)

This program review has adopted a new process that emphasizes collaboration between the review team, external reviewers, the Department, the College, and the University. The goal is to explicitly integrate student learning and assessment into the campus program review process.

To assist the graduate programs in the College of Engineering and Computer Science (ECS) with its assessment and program review efforts, our review team has carefully reviewed the following documents:

The ECS Self-Study Proposals:
   The ECS Self-Study Proposals:
   Self-Study Proposal for Computer Science and Software Engineering,
   Department of Computer Science (CS)
   Self-Study Proposal for Electrical and Electronic Engineering (EEE)
   and Computer Engineering (CpE), Department of Electrical and
   Electronic Engineering (EEE)
   Self-Study Proposal for Mechanical Engineering, Department of
   Mechanical Engineering (ME)
   Self-Study Proposal for Civil Engineering, Department of Civil
   Engineering (CE)

The ECS Self-Study Reports, June 2010
   Self-Study Report for Computer Science and Software Engineering,
   Department of Computer Science (CS)
   Self-Study Report for Electrical and Electronic Engineering (EEE)
   and Computer Engineering (CpE), Department of Electrical and
   Electronic Engineering (EEE)
   Self-Study Report for Mechanical Engineering, Department of
   Mechanical Engineering (ME)
   Self-Study Report for Civil Engineering, Department of Civil
   Engineering (CE)
The ECS Updated Self-Study Reports, January 2011:
Fall 2010 Graduate Program Progress Report, Department of Computer Science (CS)
Graduate Program Review Interim Report on Assessment and Review, Department of Electrical and Electronic Engineering (EEE)
Mechanical Engineering Graduate Program Review Supplementary Report, Department of Mechanical Engineering (ME)
Addendum to the Graduate Program Self-Study Report, Department of Civil Engineering (CE)

Comments regarding ECS self study reports and proposals by Dr. Terry Underwood, the University Assessment Coordinator, Office of Academic Program Assessment (OAPA)

External Consultant Reports:
External Consultant Report for Computer Science and Software Engineering, Dr. Orlando Madrigal
External Consultant Report for Electrical and Computer Engineering, Dr. Michael Ward
External Consultant Report for Mechanical Engineering, Dr. Michael Ward
External Consultant Report for Civil Engineering, Dr. Michael Ward

The Departments’ Most Recent Assessment Reports:
The 2009-2010 Annual Assessment Report for the Department of Computer Science (CS)
The 2009-2010 Annual Assessment Report for the Department of Electrical and Electronic Engineering (EEE)
The 2009-2010 Annual Assessment Report for the Department of Mechanical Engineering (ME)
The 2009-2010 Annual Assessment Report for the Department of Civil Engineering (CE)

Fact Books:
The Fact Book for the College of Engineering and Computer Science
The Fact Book for the Department of Computer Science (CS)
The Fact Book for the Department of Electrical and Electronic Engineering (EEE)
The Fact Book for the Department of Mechanical Engineering (ME)
The Fact Book for the Department of Civil Engineering (CE)

Websites:
The website for the College of Engineering and Computer Science
The website for the Department of Computer Science (CS)
The website for the Department of Electrical and Electronic Engineering (EEE)
The website for the Department of Mechanical Engineering (ME)
The website for the Department of Civil Engineering (CE)


Sacramento State Baccalaureate Learning Goals for the 21st Century

WASC (Western Association of Schools and Colleges) Assessment and Program Review Documents and Rubrics
- WASC Resources Guide for ‘Good Practices’ in Academic Program Review
- WASC Rubric for Assessing the Quality of Academic Learning Outcomes.
- WASC Rubric for Assessing the Use of the Capstone Experience for Assessing Program Learning Outcomes.
- WASC Rubric for Assessing the Use of Portfolio for Assessing Program Learning Outcomes.
- WASC Rubric for Assessing the Integration of Student Learning Assessment into Program Reviews.
- WASC Rubric for Assessing Educational Effectiveness
  http://www.wascsenior.org/node/211
- WASC Rubrics for Assessing Undergraduate Majors

WASC Commission Action Letter to President Gonzalez, July 17, 2007
http://www.csus.edu/wascaccreditation/WASC_Commission_Action_Letter.pdf

Report of the WASC EER (Educational Effectiveness Review) Visiting Team from June 2009.
(http://www.csus.edu/wascaccreditation/Report%20of%20the%20WASC%20EER%20Visiting%20Team%20April%202009.pdf)


Liberal Education and America’s Promise (LEAP) by Association of American Colleges and Universities, http://www.aacu.org/LEAP/index.cfm

The Essential Learning Outcomes developed by LEAP
http://www.aacu.org/leap/vision.cfm
Program Review at Sacramento State
http://www.csus.edu/acaf/progReview/

Office of Academic Program Assessment at Sacramento State
http://www.csus.edu/programassessment/index.html

The University Strategic Plan

In the process of this review, our review team has interviewed department chairs, graduate program directors, faculty, staff, graduate students, and industry Advisory Board members in the College, including:

- Dr. Cui Zhang, CSC/SE Chair
- Dr. Nik Faroughi, CSC/SE Graduate Program Coordinator
- Dr. Suresh Vadhva, EEE/CPE Chair
- Dr. Preetham Kumar, EEE/CPE Graduate Program Coordinator
- Dr. Sue Holl, ME Chair
- Dr. Ken Sprott, ME Graduate Program Coordinator
- Dr. Ramzi Mahmood, CE Chair
- Dr. Cyrus Aryani, CE Graduate Program Coordinator

Industrial Advisory Board representatives:
- Kathy Wendt (SRA International), CSC
- Kishore Rao (Intel), EEE/CPE
- Shaun Immeker (Intel), ME
- Michael Penrose (Sac County Dept of Transportation), CE
- Marco Palilla (HDR Inc), CE
- Janis Hulla (US Army Corps of Engineers), CE

We have also consulted:
- Dr. Don Taylor, Director, Academic Planning and Quality
- Dr. Emir J. Macari, Dean of the College of Engineering and Computer Science (ECS)
- Dr. John Oldenburg, Special Assistant to the Dean of ECS
- Dr. Chevelle Newsome, Dean, Graduate Studies
- Dr. Terry Underwood, University Assessment Coordinator
- Dr. Chris Miller, Chair, Senate Graduate Policies Committee
- Dr. Michael Ward, External Consultant for Electrical, Computer, Civil and Mechanical Engineering, Dean, College of Engineering, Computer Science, and Construction Management, California State University, Chico
- Dr. Orlando Madrigal, External Consultant for Computer Science and Soft Engineering, Professor, College of Engineering, Computer Science, and Construction Management, California State University, Chico
The review team thanks all the above colleagues who have made a tremendous contribution to the success of this program review, especially Dr. John Oldenburg (Special Assistant to the Dean of ECS), Dr. Emir J. Macari (Dean of the College of Engineering and Computer Science), and Dr. Don Taylor (Director, Academic Planning and Quality).

We would also like to thank the Office of Academic Affairs, the College of Engineering and Computer Science, the Department of Computer Science (CS), the Department of Electrical and Electronic Engineering (EEE), the Department of Mechanical Engineering (ME), and the Department of Civil Engineering (CE).

We are very fortunate to work with Dr. Terry Underwood (the University Assessment Coordinator), Dr. Chevelle Newsome (Dean, Graduate Studies), Dr. Chris Miller (Chair, Senate Graduate Policies Committee), Dr. Michael Ward (External Consultant for Electrical, Computer, Civil and Mechanical Engineering), and Dr. Orlando Madrigal (External Consultant for Computer Science and Soft Engineering). We sincerely appreciate their insight and support.

Significant progress in assessment has been made in the graduate programs in the College of Engineering and Computer Sciences during this self-study and program review cycle. However, the progress is uneven among the four departments and a great deal of work needs to be done to sustain such efforts. The following are our team’s findings, which are presented in the form of commendations and recommendations for the College and then for each department.

**COMMENDATIONS FOR THE COLLEGE OF ENGINEERING AND COMPUTER SCIENCE**

It is clear to the review team that the College of Engineering and Computer Science is a valuable resource for the Northern California region. As a member of its Industrial Advisory Board told us, Sacramento State is the only provider in the region that allows a student to get additional expertise beyond the undergraduate degree while working full-time. The review team has also discovered that its respective Advisory Boards are strong supporters of the College. Not only do the representatives of the various Advisory Boards report that they are integral to the College’s efforts to improve the program, but that they are true partners in the process.

The review team has also found that students graduating from the College of Engineering and Computer Science are a sought after commodity, even in this current gloomy economy. Finally, the review team concludes that the Dean, department chairs, graduate program coordinators, and faculty care deeply about their graduate programs and students. As such, the review team offers the following commendations to the College as a whole:

**Commendation 1:** The review team commends the College of Engineering and Computer Science for serving as a valuable asset to the community by providing a curriculum that allows students to hold jobs in private companies and public
agencies while simultaneously completing their graduate degree. The College’s effort is essential to the mission of the University.

Commendation 2: The review team commends the College of Engineering and Computer Science for cultivating a strong support base through its Advisory Boards. This support is critical in these tough budget times.

Commendation 3: The review team commends the College of Engineering and Computer Science for producing valued employees that are sought after by regional private companies, consulting firms, and public agencies.

Commendation 4: The review team commends Dr. Emir J. Macari, Dean of the College of Engineering and Computer Science, and Dr. John Oldenburg, Special Assistant to the Dean, for their leadership and commitment to the engineering and computer science graduate programs and to the College’s program review and assessment efforts.

Commendation 5: The review team commends the College of Engineering and Computer Science for working closely with the review team and for using the team’s suggestions to improve student assessment and learning. Some of this progress can be seen in the graduate programs’ January updates.

Commendation 6: The review team commends the faculty and staff members for their hard work and commitment to the graduate programs and their students.

RECOMMENDATIONS FOR THE COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

While the review team has found that the College is doing an admirable job in offering a flexible program that produces quality graduates, there is room for improvement. For example, while the Advisory Board is supportive, individuals in these groups have offered to do even more for the College, including volunteering as guest speakers where appropriate and providing potential funding for some specialized classes that might have low enrollment. Additionally, while some of the departments in the college have taken great strides in their assessment planning and execution efforts, others are comparatively behind in their efforts. More data from the graduate programs are needed to demonstrate student learning and success. Moreover, data also need to be intentionally used to improve student learning in classes as well as for the graduate programs as a whole.

During our visit with faculty, the review team also had the opportunity to discuss the fiscal realities in which the CSU currently lives. To sustain the assessment effort in this tough budget time and to make the program review and annual assessment more effective and efficient, we concur with Dr. Terry Underwood (the University Assessment Coordinator) that the College needs to:
“Organize assessment work at the level of the College. All programs should feed into a college-level framework of outcomes, which should be clearly connected to the BALGs (Baccalaureate Learning Goals). When the grad outcomes are established, the same should be true of the graduate programs. There is no need for separate departmental reports. All of the assessment work could be communicated in a single College document, or perhaps two (one undergrad, one grad.)”

“Develop an electronic platform for assessment that serves the need of collection, selection, reflection, analysis, and reporting. To do this, have the College assessment leaders study literature on portfolio assessment as well as electronic platforms. Design a teach-by-learn matrix and use it to build a portfolio handbook and a set of practices that result in meaningful data.”

Moreover, like all programs on campus, colleges and departments are being asked to find efficiencies in their own curriculum. Since graduate classes typically have lower enrollment, there is less efficient in their student/faculty ratio. It is imperative that the College consider ways to build greater efficiencies into its programs and simultaneously protect the integrity of the graduate programs as well. One possibility for the college efficiency is to develop a course that all students in the College could take as part of the core curriculum. Such a core course would not only help provide students with the opportunity to meet, collaborate, and enhance their academic growth with other students in the College, but would substantially improve efficiency for the College.

Given the discussion above, the review team offers the following recommendations to the College as a whole.

**Recommendation 1: Think strategically about how to carry out program review and assessment for the six graduate programs in the College so that assessment activities will benefit student learning and success, promote these programs, and avoid undue stress for the faculty.**

The College has just gone through a successful ABET accreditation for its undergraduate programs. Many of the good practices, rubrics, and strategies used in the ABET accreditation review can be transferred easily to the graduate program review and assessment.

However, many departments and faculty are overwhelmed after the ABET accreditations for the undergraduate programs. Moreover, there is a considerable variation in the quality of the assessment efforts for the College’s graduate programs. Some have articulated clear learning outcomes and objectives and developed excellent rubrics, while other programs still need to clarify what their graduate student learning outcomes are.

Thus, the College needs to think strategically about how it can build the college capacity to promote and oversee sustainable program review, accreditation, and assessment efforts.
and to get students and faculty actively involved with limited stress. Using existing resources, organizing assessment work at the level of the College, and using technology to develop an electronic platform for assessment that serves the need of collection, selection, reflection, analysis, and reporting are some of the options that need to be explored in the future.

**Recommendation 2:** From this review cycle, it can be seen that great progress in program review and assessment has been made in some of the graduate programs. However, to move assessment to the next level and keep the effort sustainable, the College needs a great deal of help and support. Please seek help from the Office of Academic Program Assessment in developing a list of reasonable graduate learning outcomes and objectives that are most important to the College and are clearly different from the undergraduate learning outcomes and objectives. Moreover, clearly articulate the direct connections among course learning outcomes, program learning outcomes, college/university learning outcomes, or national disciplinary standards such as ABET standards/trends.

Rubrics are needed to explicitly evaluate student learning outcomes and clarify the purpose of a thesis and many other key assignments and projects in the core courses of the graduate programs. The key that directly links the program’s learning outcomes and students’ work and projects (the key assignments) is the rubric that clearly specifies the criteria of how students can demonstrate their learning and how students’ work will be analyzed.

The graduate programs and the College do not need to create these rubrics from scratch. The College has just gone through a successful ABET accreditation for its undergraduate programs. The College and the undergraduate programs have created many rubrics that the graduate programs can borrow and modify.

**Recommendation 3:** Modify existing high quality rubrics, such as the VALUE rubrics, and use them to directly analyze graduate student work.

Moreover, the Association of American Colleges and University (AAC&U) has developed 15 VALUE (Valid Assessment of Learning in Undergraduate Education) rubrics for the faculty in the College to borrow and/or modify as well:

**I: Intellectual and Practical Skills (10 Rubrics)**
- Inquiry and analysis
- Critical thinking
- Creative thinking
- Written communication
- Oral communication
- Reading
- Quantitative literacy
- Information literacy
- Teamwork
Problem solving

II. Personal and Social Responsibility (4 rubrics)
- Civic knowledge and engagement—local and global
- Intercultural knowledge and competence
- Ethical reasoning
- Foundations and skills for lifelong learning

III. Integrative and Applied Learning (1 Rubric)
- Integrative learning

Modifying the above rubrics will save the faculty in the College a great deal of time and energy.

Recommendation 4: Use program review and assessment data to improve not only the student learning in a class, but also the graduate programs in the College. Use assessment results to make other important budgeting and planning decisions in the College as well.

Recommendation 5: Organize all of the above assessment efforts at the college level, and use technology to develop an electronic platform for assessment that serves the need of collection, selection, reflection, analysis, and reporting in the College.

The E-portfolios have the potential not only to make the assessment and program review at the College more efficient and effective, but also to enable students to easily collect, analyze, and reflect on their own learning from the very beginning of their graduate career to the end when they finish their thesis, projects, or comprehensive exams.

Recommendation 6: Explore ways to better utilize the Industrial Advisory Boards for more support.

Recommendation 7: Find ways to better utilize existing resources to enhance the efficiency of the curriculum, such as developing common core graduate courses for all graduate students at the College.

Recommendation 8: Explore creative ways to provide more sustainable support to all the graduate programs and their coordinators in the College.

The assigned time for graduate coordinators varies in the College. The graduate coordinators from the Department of Computer Science and the Department of Electrical and Electronic Engineering receive three units of assigned time a semester. In contrast, the graduate coordinators for Mechanical Engineering and Civil Engineering receive three units of assigned time a year. The College needs to work with all the departments to find creative ways to provide sustainable and balanced support for all the graduate programs.
Recommendation 9: Work closely with the Graduate Office and the University to provide better support for the College’s graduate admission so the graduate programs in the College can manage their graduate enrollment, especially the enrollment of the international students, more successfully.

The College needs to find better ways to ensure that its graduate programs are equally engaging in assessment, and understand the need and the value in promoting assessment. To this end, the review team offers the following recommendations:

10. Require departments to update their assessment plans to include assessment procedures for graduate programs.

11. Require departments to include their graduate program(s) in their annual university assessment report.

12. The Dean’s office should clearly stipulate the consequences if the departments fail to achieve satisfactory progress in their graduate assessment efforts.

GRADUATE PROGRAMS
IN COMPUTER SCIENCE AND SOFTWARE ENGINEERING

The Computer Science Department offers M.S. degrees in Computer Science and Software Engineering as well as Certificates of Advanced Study in the Computer Science Program. As indicated in its self-study document, the primary goal of the M.S. program is to “prepare students to serve as effective professional computer specialists and software engineers” and a secondary goal is to “prepare interested students for research, teaching, or further study toward Ph.D. programs in Computer Science and Software Engineering.”

The review committee is pleased to see that the department has a clear understanding of the department objectives and has taken concerted efforts to accommodate Sacramento State students already working in the field by scheduling classes that meet one day a week, in the evenings and on Fridays.

In addition to offering a diverse curriculum that meets their program goals, faculty members continue to contribute to the knowledge in their discipline. As noted in their self-study, from 2004-2009, faculty members published 28 journal articles, 9 books, and presented 111 conference papers while simultaneously serving as conference chairs, conference organizers, and program committee members. When they are not teaching or researching, they are also actively seeking external funding through a variety of grant sources. Both internal and external funding that they have secured over the time period covered by this review shows a commitment to finding support to assist their teaching and research in these tough budgetary times.

In their self-study, the two graduate programs (computer science and software engineering) opted to review and report on their assessment efforts with a focused inquiry
“to investigate the quality of the culminating requirement in the programs, i.e., MS projects or theses.” The focused inquiry seemed appropriate given that the Department places great emphasis on the ability to “prepare student to be successful, professionals, civic leaders, and informed citizens in a diverse national and global society.”

In general, the review team is impressed with the graduate programs in Computer Science and Software Engineering and our observation is mutually shared by others. In fact, the external reviewer, Dr. Orlando Madrigal, noted that, “…it would not be presumptuous to state that the CSUS Department of Computer Sciences is one of the premier programs in computing in the CSU.” In our own discussions with Dr. Madrigal, it was clear that his assessment did not come lightly. Not only has Dr. Madrigal played an important development role in ABET, but Sacramento State is the seventh CSU in which he has served as the Computer Science external reviewer. Given the depth and breadth of his experience, his praise is quite noteworthy.

**Commendation 1:** The review team commends the Department for its ability to successfully obtain significant grants.

**Commendation 2:** The review team commends the Department for being recognized as one of the premier programs in computing in the CSU system.

**Commendation 3:** The review team commends the Department for its continued scholarship efforts.

Given the Department’s decision to select an assessment focus, careful attention has been given by the review team to review the Department’s assessment efforts. It is clear that assessment has been part of the Department, given expectations of ABET for the undergraduate curriculum. The review team is pleased to see that the Department continued its assessment efforts from the initial presentation of its self-study in the summer of 2010 to its progress report completed in January 2011.

Important student learning outcomes for the Department’s graduate program include:

1. An ability to apply knowledge from undergraduate and graduate computer science and other disciplines to identify, formulate, and solve novel and complex computer science or software engineering problems that require advanced knowledge within the field.
2. An ability to understand and integrate new knowledge within the field.
3. The ability to plan and conduct an organized and systematic study on an advanced topic within the field.
4. The ability to work as a team in a diverse changing world, recognize the ethical standards, and possess skills for effective oral communication.

Taken as a whole, faculty members in this department have put a great deal of effort into their graduate program review and assessment. A review of the many rubrics that they have created to make sense of collected data is but a small demonstration of work product
that they have created. Given their efforts, the review team recognizes the commitment and progress they have made and as such, the following commendations are offered:

Commendation 4: The review team commends the Department Chair and the Graduate Coordinator for their leadership and commitment to graduate program review and assessment.

Commendation 5: The review team commends the faculty in the Department for their hard work in the graduate program review and assessment.

Commendation 6: The review team commends the Department for developing an assessment plan that gets at the types of data that are necessary to understand what the students are learning.

Commendation 7: The review team commends the Department for carefully constructing rubrics to evaluate the learning of graduate students.

The review team agrees with the University Assessment Coordinator’s belief that it is important to “close the loop” or to make changes in curriculum once assessment data is collected. One way that the Department has made the effort in this regard is the change in its process for “improving assessment of written communication” as noted in its self-study. The practice of increasing the number of evaluators for MS project reports in spring 2010 is one step in the right direction. As such, the following commendations are proposed:

Commendation 8: The review team commends the Department for its efforts to “close the loop” with assessment data.

Commendation 9: The review team commends the Department for engaging and implementing strategies to improve the analysis efforts in the assessment process.

Although the Department clearly has made great strides in assessment, there are clearly some changes that would assist the two graduate programs in the future. As Dr. Madrigal pointed out, “Graduate assessment in the College of ECS is in its initial stages and the summary data presented in the computer science assessment report is a good starting point.” So how might the Department focus its efforts? The current assessment plan places great emphasis on assessing student oral and written skills. This happens once the thesis or project is complete, and such a strategy may provide a “narrow view of a student’s capabilities and is not necessarily the most effective means to measure the quality of the graduate program offerings” as explained by Dr. Madrigal. Further, as noted by Dr. Madrigal, as the department continues to consider its assessment efforts, “it will be beneficial for the faculty to expand their definition of learning outcomes as a continuing process to encompass the student’s entire MS graduate student experience at CSUS.”
The review team agrees with Dr. Madrigal’s assessments of the Department’s efforts. While the Department’s efforts are noteworthy, there is room for improvement. As such, the following recommendations are also proposed:

**Recommendation 1: The assessment plan is only a “starting point” for the Department. Efforts need to be made to continue to retool and reconsider the assessment plan.**

For example, the two graduate programs need to further “articulate the direct connections among course learning outcomes, program learning outcomes, college/university learning outcomes (once the University/the College has established them), or national disciplinary standards such as ABET standards/trends” as we have suggested for all the graduate programs in the College.

**Recommendation 2: The assessment plan needs to better distribute data collection across the career of a graduate student by finding additional ways to collect assessment data at multiple points.**

In our various interviews with students and the Advisory Board, it becomes apparent that oral and written communications are important to the Department’s students and that the Department has made a concerted effort to assess how students are doing in these areas. As such, the review team recommends the following:

**Recommendation 3: Find ways to provide students with more opportunities to improve their oral and written communication skills throughout the entire graduate program process.**

**Recommendation 4: Use program review and assessment data to improve not only student learning in a class, but also the graduate programs in the Department. Use the results of assessment to make other important budgeting and planning decisions at the department and the program level as well.**

**Recommendation 5: The Department should make use of university resources, such as the University Assessment Coordinator, to assist the faculty in their future assessment efforts.**

---

**GRADUATE PROGRAMS IN ELECTRICAL AND ELECTRONIC ENGINEERING (EEE) AND COMPUTER ENGINEERING (CPE)**

The Department completed its self-study in summer 2010. As the result of discussions with the review team and additional consideration of its program and assessment efforts, an Interim Report on assessment and review was provided to the internal and external reviewers in January 2011. The internal review team appreciates the time and effort to present a follow-up report as it has provided concrete data and identified specific ways in which the Department is making progress in its two graduate programs. For its self-study,
the Department opted to examine its assessment efforts with a focused inquiry as identified in its summer 2010 self-study report on quality and goals of the culminating experience of the students.

Within the Department, students are provided with three options for the culminating experience, including:

1) Thesis. Students complete research and write about that research. A supervisory committee that includes a primary faculty advisory and two additional advisors are used (5 units).

2) Project. Students complete a project under the supervision of a faculty advisor and an additional advisor (2 units)

3) Comprehensive Examination. Students complete a 4-hour exam to show their general and specific knowledge of their discipline.

Between 2005 and 2010 the Department experienced considerable growth. During this time, it increased its graduate student enrollment over 60 percent. At the time of this report, the Department has nearly 300 students in its two graduate programs, which makes them one of the large graduate programs at Sacramento State.

Given their experience with ABET, the EEE graduate programs modeled their MS assessment programs after their BS programs. The EEE graduate program has 10 student learning outcomes at the program level. These learning outcomes include:

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.
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 a societal context.
10. Recognition of the need for and an ability to engage in “life-long” learning.

Although many principles of the EEE graduate program overlap with Computer Engineering (CpE), they do not align perfectly. As such, there is a need to include outcomes that differ. The CpE graduate learning outcomes include:

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 CpE.
4. A knowledge of core and advanced CpE topics.
5. The ability to use contemporary engineering techniques and tools for analysis and design.
6. The ability to work with modern instrumentation, software, and hardware, design and perform experiments, and analyze and interpret the results.
7. The ability to communicate effectively
8. An understanding of professional and ethical responsibility and a broad education to appreciate the impact of engineering solutions in a societal context.
9. Recognition of the need for and an ability to engage in “life-long” learning.

In its assessment effort, the Department uses different forms of direct evidence (such as assessment from culminating projects and course based assessment) and indirect evidence (such as surveys from graduate students and from the Industry Advisory Board).

The review team is pleased to see in the Interim Report that the Department is finding ways to use its assessment data to make specific changes to its curriculum and to improve student learning in these courses. For example, changes to eight courses are listed to demonstrate how the assessment data is having a direct impact on how material is being taught. Although each of the course changes will not be discussed, it is important to consider at least one as a representative example. For EEE 262 (Wireless Communications), as the result of the assessment efforts, more homework was introduced through problem sets to increase student understanding of cellular concepts and an increase in working through homework problems in class is adopted. The effect, as reported by the Department, has resulted in “partial improvement in student understanding of cellular concepts.” This process of questioning the curriculum, collecting data, and tying specific changes to classes is invaluable.

Finally, it is also noted by the review team that the Department is reviewing its assessment data to find trends and patterns and to consider how individual faculty members are impacted. For example, in its Interim Report, the Department notes that, “One mechanism that was introduced last year was to avoid too many (> 10) projects or thesis falling under the supervision of a single faculty member at any given time.”

Taken as a whole, the Department has shown that it is serious about assessment and uses assessment to improve student learning in these assessed courses. Further the review team agrees with the external reviewer, Dr. Mike Ward in his assessment of the state of the assessment plan and execution. As such, the following commendations are offered:

**Commendation 1: The review team commends the Department for offering an assessment plan that is the most ambitious among the three engineering departments.**
Commendation 2: The review team commends the Department for its serious approach to program assessment.

Commendation 3: The review team commends the Department for developing a plan that includes both direct and indirect forms of evidence.

Commendation 4: The review team commends the Department in its efforts to use assessment data to make class changes and enhance student learning.

Although the review team and the external reviewer have found the assessment plan to be well developed and exhaustive, there is some concern about the viability of sustaining such an elaborate and labor intensive effort over long periods of time. There are at least two solutions that the Department should consider in the short-term, besides the suggestions offered for the College at a whole. First, rethink the identified learning outcomes. Can the two graduate programs achieve what they want with only five outcomes? If so, why not consider a reduction which will naturally impact the quantity of data that needs to be collected and analyzed. Second, consider alternatives to the assessment plan that is driven exclusively by the faculty. Students need to know when they have reached their intellectual destination. Assessment models that ask students to assume more responsibility might prove helpful to the Department.

Beyond the logistics and workload, the review team, along with the external reviewer, has noted two potential problems: 1) the lack of clear links between course learning outcomes and program learning outcomes and 2) the lack of clear rubrics to assess student learning outcomes. The Department would do a great service to itself and its students if the Department can carefully construct rubrics to assess student work in different classes and in the culminating experiences. Not only should effective rubrics yield more reliable and valid data, but they can reduce faculty workload in the long term.

Given an understanding of changes that the Department should consider, the following recommendations are proposed:

Recommendation 1: Given the ambitious assessment plan, it may be difficult to sustain it over a long period of time. Find ways to simplify the assessment plan so that it can be managed more easily and still accomplish the most important goals.

Recommendation 2: Reconsider the total number of learning outcomes. The presence of too many learning outcomes might hurt the programs by hiding what is most important for the Department.

Recommendation 3: Articulate the direct connections among course learning outcomes, program learning outcomes, college/university learning outcomes (once the University/the College has established them), or national disciplinary standards such as ABET standards/trends as we have suggested for all the graduate programs in the College.
Recommendation 4: Create clear and meaningful rubrics to assess student learning and overall program quality. Clear rubrics will help standardize individual ratings and strengthen the recommendations that will derive from the collected data.

Recommendation 5: Consider ways to get graduate students more involved in the assessment of their graduate experience.

Recommendation 6: Use program review and assessment data to improve not only the student learning in a class, but also the two graduate programs in the Department. Make use of assessment results in other important budgeting and planning decisions at the department and the program level as well.

Recommendation 7: Use university resources, such as the University Assessment Coordinator, to assist in future assessment efforts.

GRADUATE PROGRAM IN MECHANICAL ENGINEERING

The M.S. program in the Department of Mechanical Engineering has been designed to provide students with a theoretical background and the opportunity to apply their knowledge. Between 2005 and 2009, the Department experienced a growth in the total number of students in their graduate program. In recent years, admission to the graduate program has become more competitive. In fall 2010, 16 students were accepted from a pool in which about two-thirds of applicants were denied admissions. Faculty members in the Department specialize in a variety of areas, including: applied mechanics and design, manufacturing, materials science, and thermal sciences. During this same period of time in which the program experienced student growth, the faculty maintained their scholarly activity with 60 conference papers and publications.

For the purposes of this program review, the Department has opted to examine its assessment efforts and to conduct a focused inquiry regarding the ability of their graduates to “undertake and complete independent work and be able to effectively communicate the important aspects of their work.” To this end, the Department has sought to answer three questions, which include:

1. How well does the curriculum and thesis/project component prepare students for industry employment or further graduate study?
2. How well does the content and structure of the program meet the workforce needs of the region and California?
3. How well does the content and structure of the program meet the needs of our faculty in maintaining fulfilling professional lives?

Like other departments in the college, the Department of Mechanical Engineering has considerable experience to draw upon in its assessment efforts from its ABET requirements. The Department has done an excellent job to not simply copy what it does with its undergraduate program. It is seemingly clear that the Department understands that there are clear and important differences in the expected and actual education experiences
of graduate students versus undergraduate students. While the undergraduate program has an exhaustive list of learning outcomes as directed by ABET, the list for the Department’s graduate program is more appropriate for graduate level teaching and learning. The graduate learning outcomes include:

1. Will enter professional employment and/or Ph.D. program in a related field.
2. Demonstrates knowledge of the principles of science, mathematics, and engineering, to identify, formulate, and solve problems in mechanical engineering.
3. Demonstrate creativity in the design of systems, components, processes, and/or experiments and in the application of experimental results to independently address a focused research question.
4. Demonstrate effective written and oral communication using technical standards.

The Department appropriately indicates that “the learning outcomes for the graduate program reflect the emphasis on specialization within the mechanical engineering profession and preparation for either professional practice or a continuation of graduate school.”

Commendation 1: The review team commends the Department for maintaining its scholarly activity.

Commendation 2: The review team commends the Department for having a proposed assessment plan that is appropriate for a graduate program.

Commendation 3: The review team commends the Department for including direct and indirect assessment measures.

Commendation 4: The review team commends the Department for having a narrowed and defined set of student learning outcomes.

Since the Department is in the early stage of implementing its assessment plan and much of the data is to be used, there is insufficient data to assess the degree to which the Department is able to execute its plan and use the data to make important and meaningful changes. To this end, the review team offers suggestions that the Department should consider as the faculty move forward with their assessment efforts.

Any rubrics that the Department intends to use to analyze relevant data would have been nice to see. Given the absence of these rubrics, it is imperative that the Department pay careful attention as the faculty move forward. As the external reviewer, Mike Ward noted in his report, “the development of rubrics should proceed easily from those developed for the undergraduate program, but it should be emphasized that they be sufficiently broad to apply to all graduate student experiences.”

One area in which data has been collected and reported pertains to faculty perceptions of workload, job satisfaction, and the direction of the graduate program. Specific items included:
1. Your satisfaction with the course offerings for the M.S. program.
2. Your satisfaction with the quality of the M.S. students.
3. Your satisfaction with the final thesis quality produced.
4. Your satisfaction with the professional development opportunities provided by offering the ME M.S. program.

While the scores are rather high for satisfaction with the quality of the MS students and final thesis quality produced, the scores are lower for satisfaction with course offerings and professional development opportunities.

Given the review team’s review of the supporting documents submitted by the Department and the various interviews that have been conducted, besides the recommendations offered for the College, the following recommendations are proposed:

**Recommendation 1:** The Department’s third learning outcome, which reads, “Demonstrate creativity in the design of systems, components, processes, and/or experiments and in the application of experimental results to independently address a focused research question” is difficult to assess. Consider altering attempts to “demonstrate creativity” to something more tangible or spend time developing an agreed upon rubric to make this item more objective.

**Recommendation 2:** Articulate the direct connections among course learning outcomes, program learning outcomes, college/university learning outcomes (once the University/the College has established them), or national disciplinary standards such as ABET standards/trends, as we have suggested for all the graduate programs in the College.

**Recommendation 3:** Develop rubrics carefully. How the Department chooses to measure assessment data will greatly impact the type and value of the data that will be collected.

**Recommendation 4:** Pay careful attention to the processes that the Department will use to “close the loop.” Make sure to use program review and assessment data to improve not only the student learning in a class, but also the graduate program in the Department. Make use of assessment results in other important budgeting and planning decisions at the department and the program level as well.

**Recommendation 5:** Use university resources, such as the University Assessment Coordinator, to assist in future assessment efforts.

**Recommendation 6:** Continue to carry out the proposed surveys for the focused inquiry so the department can have better data for the three inquiry questions the Department proposed to study in its self-study proposal:

1) How well does the curriculum and thesis/project component prepare students for industry employment or further graduate study?
2) How well does the content and structure of the program meet the workforce needs of the region and California?
3) How well does the content and structure of the program meet the needs of our faculty in maintaining fulfilling professional lives?

The survey response rates for the focused inquiry are very low, so we hope the Department can find ways to increase the response rates so the graduate program will have better data to answer the above three questions.

Recommendation 7: Continue to analyze the data and reflect on the results from the above three questions and come up with suggestions to improve student learning and the graduate curriculum.

GRADUATE PROGRAM IN CIVIL ENGINEERING

The graduate program in the Department of Civil Engineering offers an M.S. degree with concentrations in environmental/water quality engineering, geotechnical engineering, structural engineering, transportation engineering, and water resource engineering. Students also have an option of completing an emphasis in engineering management should they elect to take specific courses in the College of Business Administration. The composition of the student body includes primarily “practicing professional engineers,” which makes this program ideal for local practitioners that no other program in the region fills.

For this iteration of its program review, the Department has selected to examine its assessment efforts with a focused inquiry on general curriculum matters. The focused inquiry has asked three questions, which include:
1. How well does the graduate curriculum serve our professional community?
2. What are the delivery methods that work effectively in achieving our graduate program educational objectives?
3. What makes our program attractive to the graduate students? How does our program affect our graduates?

With respect to its assessment efforts, the Department has identified three educational objectives for graduate students graduating from its program. These objectives include:
1. Succeed in professional employment at their chosen specialty of environmental, geotechnical, structural, transportation, or water resources engineering.
2. Identify, analyze, and solve complex practical civil engineering problems in their chosen field of specialty.
3. Communicate effectively about technically complex engineering problems to peers, other professionals, decision makers, and the general public, in the conduct of their work.
During the review period, faculty members have showed great professional research involvement and great efforts to secure external funding. Furthermore, they have offered a robust and flexible graduate program to serve practicing professionals in the area. As such, the review team would like to recognize their efforts with the following commendations:

Commendation 1: The review team commends the Department for its engagement in scholarly activity.

Commendation 2: The review team commends the Department for its systematic and ongoing efforts to secure external funding for its program.

Commendation 3: The review team commends the Department for providing flexibility in its scheduling so that working professionals can be served through evening courses.

Commendation 4: The review team commends the Department for offering a graduate program that serves an important local population of practicing professionals.

Although the review team has found that the Department serves a critical need of the region, there are some concerns about the plan, state, and progress of the assessment efforts of the Department. The Department needs to make significant progress in designing an assessment plan, executing it, and using the assessment data. As noted by the external reviewer, Mike Ward, “the program assessment plan proposed in the self-study is not well developed,” and the basis of effective assessment requires clearly defined program outcomes, but “there are no stated Program Outcomes for the Civil Engineering M.S…” He recommends that the measurable outcomes mirror the stated objectives, but these graduate learning outcomes are neither present nor clear in the current assessment plan.

It is assumed by the review team that the Department has plans to further develop its assessment plan. The review team agrees with Dr. Ward that “the overall assessment plan should lead to improvement of student learning through completion of the M.S. as well as program improvement as seen by its various constituents.” Such a Department plan does not currently exist. In this spirit, it is hoped that the following recommendations are carefully considered as the Department moves forward.

Recommendation 1: A series of program learning outcomes needs to be created. These outcomes should have the capability to be measured prior to a student graduating and should mirror the educational objectives used by the Department.

Recommendation 2: Develop a systematic plan for assessing the student outcomes.

Recommendation 3: Build an assessment plan that is sustainable over time and leads to meaningful improvement in the curriculum.
Recommendation 4: Use university resources, such as the University Assessment Coordinator, to assist in future assessment efforts.

Recommendation 5: Conduct focus group interviews and alumni and graduate student surveys to find the answers to the three inquiry questions the Department proposed to study in its self-study proposal:

1) How well does the graduate curriculum serve our professional community?
2) What are the delivery methods that work effectively in achieving our graduate program educational objectives?
3) What makes our program attractive to the graduate students? How does our program affect our graduates?

Recommendation 6: Analyze the data and reflect on the results from the above three questions and come up with suggestions to improve student learning and the graduate curriculum.

RECOMMENDATIONS TO THE PROVOST AND THE UNIVERSITY

Recommendation 1: We know the Provost has worked very closely with deans to provide some support for their assessment efforts, but this support should be increased. The review team encourages the Provost to expand this effort by supporting the use of technology for teaching and learning and for program review, assessment, and accreditation in the College.

Many departments and faculty are overwhelmed after the ABET accreditations. Thus, the College needs to think strategically about how it can build the college capacity to promote and oversee sustainable accreditation, program review and assessment efforts and to get students and faculty more actively involved in teaching and learning.

Organizing the assessment efforts at the College level and using technology to develop an electronic platform for assessment that serves the need of collection, selection, reflection, analysis, and reporting may make the assessment, program review, and accreditation processes more effective and efficient. The E-portfolios have the potential not only to make the assessment and program review at the College more efficient and effective, but also to enable students and faculty to easily collect, analyze, and reflect on their own teaching and learning from the very beginning when graduate students start their career to the end when they finish their thesis, projects, or comprehensive examine.

Recommendation 2: The review team recommends the Provost consider launching more creative and efficient faculty development efforts in program review and assessment on the campus.
Under the Provost’s leadership, great progress has been made in program review and assessment in the departments, the College, and the University. However, to sustain this effort, more faculty members, with assessment interest and expertise, are needed in the departments, the College, and the University. Such interest and expertise are critical to move faculty from resistance and disengagement to a culture where assessment is valued, owned, and led by faculty.

Recommendation 3: Improve communication of the best assessment practices and sample annual assessment reports on campus, including the posting of such practices on the campus website for easy access. This would be a relatively inexpensive, efficient, and effective means of allowing the College – and all others – to benefit from the institutional knowledge and experience that we have as a community.

Recommendation 4: Explore creative ways to provide more sustainable support to the graduate programs and their coordinators in the University.

Recommendation 5: Work closely with the Graduate Office and the College to provide better support for the College’s graduate admission so the graduate programs can manage their graduate enrollment, especially the enrollment of the international students, more successfully.

RECOMMENDATIONS TO THE FACULTY SENATE

Recommendation 1: The Faculty Senate needs to work closely with the faculty and the administration to clarify the purpose of the GRADUATE program reviews on this campus and explore the best ways to achieve the desired goal. These efforts will significantly facilitate the program review and assessment in the departments, the College, and the University.

Clarify and/or develop University graduate learning outcomes, and graduate assessment policies and procedures. Communicate any changes directly to the different departments and colleges.

Our conversations with the faculty in the College and the University indicate the departments’ willingness to take the graduate program review and assessment seriously is directly related to the support they get from the college and university administration.

Recommendation 2: Based on this program review and the Self-Study Reports prepared by the four departments at the College of Engineering and Computer Science, the review team recommends:

1) The two master’s programs (Computer Science and Software Engineering) and the Certificates of Advanced Study in the Computer
Science Program at the Department of Computer Sciences be approved for six years or until the next scheduled program review.

2) The two master’s programs (Electrical and Electronic Engineering and Computer Engineering) at the Department of Electrical and Electronic Engineering be approved for six years or until the next scheduled program review.

3) The master’s program in Mechanical Engineering be approved for six years or until the next scheduled program review with an interim report due to Academic Affairs in March 2014 that satisfies both University and WASC requirements and provides appropriate data for the three questions in their focused inquiry. If a satisfactory interim report is not submitted, Academic Affairs will apply appropriate sanctions.

4) The master’s program in Civil Engineering be approved for six years or until the next scheduled program review with an interim report due to Academic Affairs in March 2014 that 1) satisfies both University and WASC requirements, 2) provides appropriate data for the three questions in their focused inquiry, and 3) includes a workable and fully implemented graduate assessment plan. If a satisfactory interim report is not submitted, Academic Affairs will apply appropriate sanctions.

The College of Engineering and Computer Science is doing an admirable job in offering flexible graduate programs that have produced quality graduate students for private companies and public agencies in the region. The College should be very proud of this accomplishment.

However, given the importance attached by the University and WASC to the assessment and program review and the need for the graduate programs to collect and use assessment data to improve student learning, curriculum planning, and budgeting, and given the fact that some of the programs did not carry out the proposed focused inquiry satisfactorily in this review cycle, the review team is recommending that two of the six graduate programs in the College finish their focused inquiry satisfactorily and provide an interim report to update Academic Affair concerning both their focused inquiry and their assessment efforts in March 2014.