

**UW-Madison College of Engineering**  
**2007- 08 Annual Report on Academic Program Assessment**  
**Moira Lafayette**  
**July 24, 2008**

## **Organizational Context**

The mission of the UW-Madison College of Engineering (CoE) is “To educate and prepare men and women to contribute as engineers and citizens through the creation, integration, application and transfer of engineering knowledge.”

The CoE’s educational objectives for undergraduates are:

1. That they will exhibit strong skills in problem-solving, leadership, teamwork, and communication;
2. That they will use these skills to contribute to their communities;
3. That they will make thoughtful, well-informed career choices; and
4. That they will demonstrate a continuing commitment to and interest in their own and others’ education

Currently the CoE fulfills its mission and educational goals by offering 12 undergraduate degrees, and administer the delivery of 22 masters level degrees and 14 doctoral degrees in a range of evolving engineering disciplines with a goal to transform engineering education to prepare future engineers to lead and navigate complex societal challenges. With a focus on transforming engineering education to prepare future engineers, the CoE 2010 projects are intended to incorporate a variety of new educational opportunities and other initiatives that are framed within the following broad themes.

- Societal/multicultural understanding
- Multidisciplinary perspective
- Flexible and relevant curricula
- Service to the profession and community
- Contemporary educational delivery
- Professional development for student

### **1. Has your school/college assessment plan been updated in the past year?**

The College of Engineering has an Academic Assessment Plan covering the period of 2003 – 2008 (view at <http://www.provost.wisc.edu/assessment/EngineeringD.pdf> ). The plan was appended in 2006-2007 in response to the 2006 review for accreditation by the Accreditation Board for Engineering and Technology (ABET). During the 2008-2009 Academic Year the plan will be reviewed and updated by the Academic Affairs Office in collaboration with departmental assessment and ABET representatives.

The Academic Affairs Office transitioned to a newly appointed Director of Assessment who will facilitate the accreditation process for the Engineering Accreditation Commission (EAC) under the Accreditation Board for Engineering and Technology (ABET) and will continue to foster the use of assessment planning and evaluation at multiple levels within the CoE to support the overall

continuous improvement process of teaching, learning and research. This position had been vacant from August 2007 through May 2008.

**2. Describe any assessment activities conducted in the school/college for unit-wide programmatic or curricular review.**

*2010 Initiative Impact Assessment*

The CoE 2010 Initiative provided the impetus to various teaching and learning projects designed to increase cross-disciplinary, cross-departmental, and cross-campus research and education. The 2010 Initiative launched 11 projects in 2007- 2008, and 9 in 2008-2009, which are framed within the goals stated below and that build upon the educational goals of the CoE. The Engineering Learning Center (ELC), on behalf of the 2010 Task conducted an overarching assessment to evaluate the relative impacts of the courses developed within the initiative. The Academic Affairs Office is in the process of compiling final project reports on the first year of the 2010 initiative which began in May 2007. Eleven projects had the goals of:

- build disciplinary excellence with multidisciplinary perspective
- nurture critical thinking,
- develop multicultural competence,
- cultivate collaboration and leadership skills, and
- promote an ethic of service to the profession and the community.

Preliminary findings of this assessment indicate that many of the introduction to engineering courses tend to foster the type of engineering student desired by the CoE as outlined by the 2010 Initiative and the National Academy of Engineering's education project the Engineer of 2020 (<http://www.nae.edu/nae/engeducom.nsf/weblinks/MCAA-5L3MNK?OpenDocument> , retrieved on July 15, 2008). In response to these initial findings, the ELC recommends further review of the common course goals and objectives among the various introduction to engineering and other courses with the CoE that were identified by students as having contributed towards a change in their attitudes, skills and abilities that align with the goals of the 2010 initiative. In addition, further analysis is recommended to determine if the characteristics of students in specific multidisciplinary courses differs significantly from the characteristics of the "typical" engineering student. This type of analysis may reveal how and why some students have a predisposition towards a multidisciplinary engineering pathway, multicultural competence; and further to determine what if any role student organizations play in contributing to the 2010 Initiative goals. Finally, the 2010 Task Force may use the information from the faculty surveys and data analysis to recognize faculty and courses that effectively build the skills, attitudes and knowledge that align with the goals of the 2010 initiative.

*Diversity Affairs Office*

The Diversity Affairs Office (DAO) conducts a variety of qualitative and quantitative assessments of students who participate in the Engineering Summer Program (ESP), and other pre-college programs, to measure the effect of program activities on student academic preparation as a result of their participation. The DAO/ESP is in an experimental phase of evaluation and is collaborating with the Engineering Learning Center (ELC) to develop a web-based survey to measure students' perception of their academic preparedness and their learning as a result of participating in the ESP. Students

also take a pre and post test to determine their level of academic preparation relative to the UW placement test to identify subject areas they might focus on to further their academic preparation.

The DAO recently began looking at data from the Student Data System Enrollment Statistics and plans to collaborate with the CoE Information Systems Office to develop a database to track information on targeted students' program participation, UW enrollment, retention and graduation rates. Targeted students include "Targeted Minority" students as defined by the UW System Administrative Guidelines, and females of all ethnicities. The data will be used in pre-college and other student services program planning to identify effective strategies to engage students in activities that lead to retention and graduation.

#### *Women in Science & Engineering Leadership Institute: PACE Survey*

The purpose of the Project to Assess Climate in Engineering (PACE) survey was to learn more about students' experiences in the CoE relative to their involvement with any student organizations, extracurricular activities or programs, and their interactions and engagement with other students and faculty. The survey was piloted with the University of Washington School of Engineering as a peer institution with a two-tier engineering admission requirement. The preliminary analysis of the data and subsequent peer-comparison report to be compiled by the UW Washington will be completed by the fall of 2008.

#### *Engineering Career Services*

The Engineering Career Services, affiliated with the Academic Affairs Office, conducts two types of employer surveys each year. The survey results are available to each of the departments within CoE to gather feedback how well their students are meeting key ABET program outcomes. These surveys are incorporated by some departments into their into departmental assessment plans. A sample of the survey instrument used to evaluate co-op students is attached in **Appendix A**.

### **3. Describe the assessment activity in your academic programs and departments.**

The Academic Affairs Offices coordinates efforts across the departments on their assessment planning, data collection and analysis, and evaluation and feedback to align with ABET accreditation requirements and to foster continuous improvement in teaching, learning and research. The recent hire of a new Director of Assessment will provide an opportunity to revisit current assessment planning relative to ABET accreditation and to the overall CoE continuous improvement processes.

#### *Assessment Plan Review*

With the hiring of a new Director of Assessment, the focus during the up coming academic year will be to start a process of reviewing each of the departmental assessment plans. The review process will be conducted in conjunction with key departmental assessment strategies which may include involvement of the curriculum committee or other assessment/ABET committee activities. Each plan will include a current description of the educational objects and program outcomes that align with ABET and the description of the assessment process, measures, tools and use of data for feedback, planning and decision making towards quality improvement.

Many department's assessment plans include a variety of assessment methods that provide information on achievement of educational objectives and program outcomes under ABET, as well as other meaningful information that can be used for improvements to the department and academic programs relative to preparing engineering students for their future professional roles. The following is a representative list of the assessment measures in place in academic departments across the CoE.

#### Alumni Survey

Educational Benchmarking, Inc. (EBI) Engineering Graduating Senior Exit survey

Course Evaluations linked to Program Outcomes

Graduating Senior Exit Survey

Program Evaluations

Curriculum Committee

Visiting Committee

Engineering Career Services

Department Self-Study (required every 10 years)

ABET Self-Study (required every 6 years)

#### *Departmental Action Plans from 2006-2007 ABET Review*

As a follow-up to the ABET review process departmental action plans were identified for continued focus and improvement of the undergraduate programming in the CoE. Recommendations for corrective actions were made for those programs in which a weakness or concern was identified. For example, it was suggested that departments identify which courses will be used for direct measures of student performance aligned with the ABET program outcomes, and then to adopt this strategy as part of their assessment plans. The goal is to incorporate these recommendations and changes to assessment strategies into each department's assessment plan as applicable.

The Mechanical Engineering Department was required to submit an Interim Report to ABET by July 1, 2008. The report focused on the actions taken to address the weakness, and provided evidence of assessment and integration of the results into program planning to assure graduates' achievement of program educational objectives in the future.

#### *Departmental Reviews*

The goals of the CoE 10-year department reviews are:

- to help assess and improve the effectiveness of the departmental strategic planning process
- to assess and improve the efficiency and effectiveness of departmental operations directed at the core departmental missions of teaching, research, and service, and
- to assess and improve the process for professional development of faculty and staff.

The Department of Electrical and Computer Engineering (ECE) initiated a self-study of their undergraduate programs in Electrical Engineering (EE) and in Computer Engineering, and reviewed the MS and PhD programs in EE. Similarly the Materials Science Program initiated a self-study of their MS and PhD programs in 2007-2008. ECE's departmental self-study has been reviewed by the CoE internal review committee and is awaiting evaluation by the external review committee expected in the fall of 2008.

The Materials Science & Engineering (MS&E), Mechanical Engineering (ME), and Industrial Systems Engineering (ISyE) departments will initiate their departmental reviews in the 2008-2009 academic year. As part of this process the ISyE department chair plans to hold a faculty retreat and focus on examining a few challenges for ISyE in the areas:

- research vitality,
- adequate funding supply for teaching and research, and
- enhancing the undergraduate program and expanding enrollment.

#### **4. Describe plans for academic assessment activities for the coming year in your school/college.**

##### *Assessment of Introduction to Engineering Curriculum*

In 2006-2007 the Academic Planning, Curriculum & Regulations Committee (APCRC) developed requirements that all Introduction to Engineering courses must meet to be on the list of approved courses that meet the General College Requirements. The requirements specify that:

1. the course must meet a set of six objectives, (**see Appendix B**)
2. the course director must assess the students' achievement of these objectives, and
3. the course director must provide assessment data to the Dean's Office of the CoE at the end of the semester.

The APCRC Committee Chair and Director of Assessment are planning to coordinate with the course directors for each of the approved introduction to engineering courses to gather the assessment data during the fall of 2008. Currently, two of the traditional introduction to engineering courses: Introduction to Society's Engineering Grand Challenges (InterEGR 102) and Introduction to Engineering (InterEGR 160) have compiled assessment data and will be providing that information to the Academic Affairs Office in August 2008. In addition, the Delta intern who led the assessment of the InterEGR 102 course is giving a paper on the project this fall at the Frontiers in Education conference.

##### *Technology Enhanced Learning*

The CoE is engaged in technology enhanced learning (TEL) with the goal of preparing STEM-based (Science Technology Engineering and Math) students to successfully participate in the 21<sup>st</sup> century global economy. With funding from the UW-Madison Office of the Provost, the CoE is engaged in a current TEL project to implement an open source course management system, known as Moodle, in place of the current CoE course management system known as eCOW. The newer version is currently referred to as eCOW2. A key component of this project is to integrate online assessment tools as part of eCOW2 to support the use of assessment by students as a tool to manage and enhance their own learning.

An additional goal relative to the effective and efficient use of E-learning is to have a web-based home within the CoE that highlights all distance-based courses, and resources for faculty to identify an effective instructional approach to enhance and support teaching, learning and instructional research goals with appropriate technology. This will be accomplished by assessing the current state of E-learning across the CoE to include: identifying the number of courses offered at as distance or blended; the various instructional techniques and technologies used; and the delivery modalities used

to meet specific communication, knowledge sharing, and informational needs of instructors and learners.