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Memorandum

To: CBE Faculty
From: Assessment Subcommittee (DJK, TWR, RES)
Re: Spring 2004 Assessment Results Summary

Results from the latest assessment tools for the spring and summer 2004 terms have been compiled and evaluated. The current analysis provides conclusions in several areas: overall trends, updates on areas of earlier concern, and new areas to monitor.

Assessment Tool Inputs

The new data available this fall is from:

- Spring 2004 course evaluation assessments
- Spring and Summer 2004 Co-op/Intern evaluations
- 2004 EBI Senior Exit Survey
- 2004 Visiting Committee Report
- 2004 Summer Lab Oral Presentation Evaluations
- Spring 2004 Instructor Course Evaluations (new)
- Agri-Industry Focus Group Discussion
- 2004 Alumni Survey (still underway)

Course evaluation outcomes assessments provide general feedback on how students perceive their competence in the departmental program outcome areas. This year, for the first time, BET a-k questions were added to the CBE 424 – Operations and Process Laboratory course. As a capstone laboratory course, it is very satisfying to see that these students at the end of their studies assess their abilities in all areas very highly. Both Madison sections had all 12 category scores above the threshold, and the Vienna section scored below our target in only the troublesome 'global and societal impact' area. Spring semester course ratings were moderately strong. As usual, ratings are high in many courses (10 or more of the 16 rated) for the hard, technical skill areas:

a – apply knowledge of math, science and engineering,
e – identify, formulate and solve engineering problems,
k – use techniques and modern tools for engineering practice,
l – engineering topics,

and scores have now become high in other areas, such as

f – professional and ethical responsibility,
h – impact in a global and societal context,
i – lifelong learning
j – knowledge of contemporary issues.

Lowest scores (7 or fewer courses) are in:

c – design a system, component or process

d – function on multi-disciplinary teams,

g – communicate effectively.

Communication skills did receive high scores in the lab courses (CBE 324, 450) as well as the courses with substantial projects (CBE 426 and 540), and this indicates that the coverage is at the expected level for semester courses. Design skills were also rated highly in CBE 450, as desired, along with 250, 426, 270, and 540. Outcome h – global and societal impact is now achieving target levels in 14 courses, and improving. Outcomes f and j will continue to need extra attention.

Uniformly high scores were also seen for the capstone design course, CBE 450, and for the control course, CBE 470. This is clearly the most important area for the program to come together. The high ratings in the capstone courses are also related to the improved scores seen on the EBI senior exit survey, as reported separately.

Co-op and intern evaluations were very good for Spring and Summer 2004. For review, the rating forms collect comments as well as ratings of 'exceeds expectations,' 'met expectations,' 'below expectations,' or 'not available' (EE, ME, BE, or NA) for each ABET outcome a-k and for overall performance. The overall ratings and the ratings in the individual ABET a-k listings were all EE or ME, with a few NA scores. However, one spring student and two summer students did receive 'below expectations' ratings in one or two specific ABET criteria. Concern on these three students has been returned to their advisors, and they will be watched in upcoming semesters to determine the depth of problems and what remedial actions may be needed. Other students received ratings of ME or EE in these areas, so this does not seem to be a general problem with the course of instruction. Following up on Fall 2003 co-op students with concerns, instructors in Summer lab or other courses assessed those two students and determined that the critical evaluations were more likely to be personality problems between evaluators and students than actual skill deficiencies in the students.

2004 Visiting Committee

The Visiting Committee, chaired by Jeffrey Siirola of Eastman Chemical, met in Spring 2004 and reviewed the CBE curriculum and assessment initiatives underway. The committee report acknowledged the new, revised Department Objectives and Educational Outcomes. The committee characterized the departmental assessment activities as thorough and recommended attention to complete documentation of the activities underway.

Agri-Business Focus Group

In January 2004, a CBE representative participated in a focus group of industrial visitors who provided feedback on student qualifications and hiring trends to the Biological Systems Engineering and Chemical and Biological Engineering departments. This group represents an increasingly large fraction of our student placements. Representatives had favorable comments, particularly on Chemical Engineering interns and new hires. Other comments were useful feedback on program priorities and new emphases. Minutes of the wrap-up report are on file.

Instructor Course Evaluation Forms

In Spring 2004 we began using a course evaluation form to allow instructors to provide feedback on each semester's class to assist planning future sections of that class, and aid in coordination between different classes in sequence. This new initiative provides a cross-check on the ABET a-k scores obtained from the students. Long-term impact on particular courses will await accumulation of two or more semesters' input, but already the inputs on student preparation from prerequisite courses has led to several recommendations. The second-semester thermodynamics course (CBE 311) instructor raised awareness of variations in preparation of CBE 211 (thermo) students from different semesters, and an *ad hoc* committee of thermodynamic instructors is now discussing expectations and issues involved in coordinating this sequence of courses. Secondly, both sections of CBE 424 – Summer Lab produced recommendations for modifications in the prerequisites desired for students in this capstone laboratory course. These recommendations will be discussed at upcoming faculty meetings.

Follow-up on Areas of Previous Concern

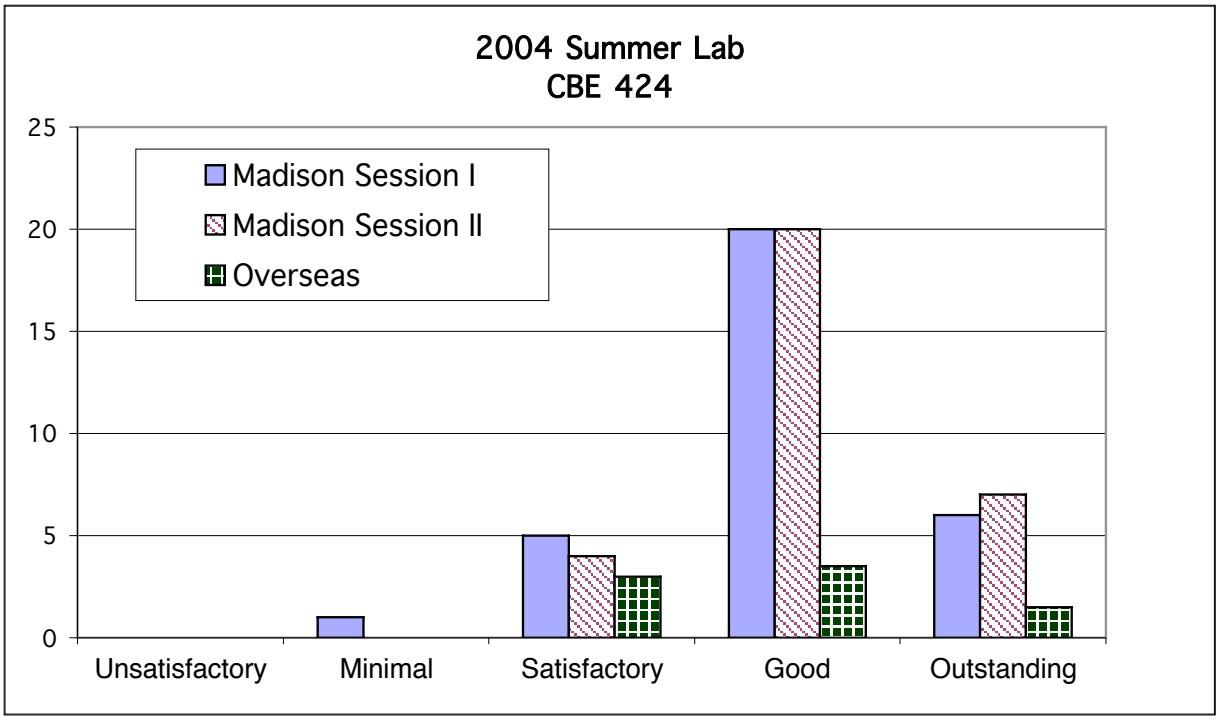
Our students continue to be rated highly for technical expertise. Assessment in the 'softer' areas continue to lag.

After the addition of two biology courses to the curriculum, the *ad hoc* Biology committee continues to monitor their implementation. In Fall 2003, Prof. Palacek met with seniors taking Zoology 570 as an elective and obtained generally positive feedback on their experiences. In Spring 2004, Prof. Murphy learned that CBE student performance in Biochemistry 501 was beginning to lag the average class performance. She has tracked this, and investigated possible reasons. Both aspects were presented to the faculty and will continue to be monitored by the committee.

Four areas are currently being monitored: 1) physics courses, 2) multidisciplinary teams, 3) oral reports, and 4) "understanding the impact of engineering solutions in a societal/global context." Current assessment tools provide no new inputs into the physics issue. This remains a college-wide problem, and will be a continuing concern for the APCRC working group.

Team-related feedback places only 6 (of 16) semester courses above the target level, but all Summer Lab students are above the target level. This demonstrates the cumulative effect of team experiences and shows the positive impact of course projects in the several courses using them.

This year, we began collecting explicit evaluations of Oral Presentation assessments by instructors in the Summer Lab sections. All students make individual presentations, and this score was pulled out separately as a diagnostic and also as a course completion requirement. Overall, presentations were rated as Good (4 on a 1-5 scale), and individually no students were 1 - Unacceptable and only one student was rated 2 – Marginal. The score distributions are as follow.



Oral communication skills are not treated separately in the course evaluation. Communication is rated lower in general, but is recognized in the courses where it receives significant attention. The ratings in the co-op/intern evaluations are satisfactory to strong, so our employers are satisfied with current levels. We will continue to emphasize this area, and to monitor progress.

The global/societal impact item (h) is at acceptable levels in this evaluation. We will continue to monitor it.

New Areas to Watch

No new weaknesses in outcomes assessment are apparent in these inputs. Our only concern is that several early courses have very low achievement of target levels. We question whether there can be improvements in these courses in connecting with department program outcomes, or if it is unrealistic for them to contribute at this early stage. If the latter is true, then it may be more appropriate to remove them from the collection of activities being monitored.

Action Items

- consider increased opportunities for team project training and practice
- identify increased opportunities for oral presentation training and practice
- improve awareness of applications, connections, and impact on outside world
- re-examine objectives and delivery of CBE 326 to improve impact and contribution
- improve coordination and communication throughout thermodynamic sequence (CBE 211/311)
- upgrade prerequisites for CBE 424 – Summer Lab. .