

## Assessment of ISE Program Outcomes

Due to the close relationship between PEOs and Program Outcomes, as well as the need for effective use of information resources, assessment of the achievement of Program Outcomes draws upon many of the same sources used for assessment of the PEOs as listed below:

1. Fundamentals of Engineering Examination PM Part. Results will be reviewed annually performance criteria of "NCSU ISE student performance equal to or better than national average for all ISE students."
2. Graduating Senior Survey. Results will be reviewed once per year, starting 2002-performance criteria of "% of ISE students responding "good" and "excellent" equal or exceed the % for the College of Engineering students."
3. Project assessment by sponsors and/or departmental visitors. While input from sponsors and/or visitors is provided and assessed every semester, a focused analysis will be conducted once per 6 year ABET cycle, typically in the year of review. Performance criteria of "above average" or "excellent" as majority responses (80% or above) from evaluators.
4. ISE Senior Exit Interview/Survey. Results will be collected every semester and reviewed every other year, starting 2001-performance criteria of "% of ISE students responding "agree" or "strongly agree" at 80% or above.
5. Results of Course Assessment Program implemented since fall 2008 and described in detail below.

In addition to these information sources, the program has organized much of its assessment and continuing improvement efforts around an ongoing Course Assessment Plan (CAP) implemented in the fall 2008 semester. Due to its central role in the assessment and continuous improvement process, this plan will now be presented in detail.

### **Course Assessment Plan (CAP)**

The Course Content Review developed by the Department prior to the 2004 visit provides a clear link between the courses and Program Outcomes. However, it was not immediately clear how to convert this into an ongoing process of assessment that would provide a foundation for continuous improvement. An effective process that would be quantitative and data-driven in nature but would not impose undue workload on faculty and teaching assistants was required. From 2004 and 2008 the department directed its major efforts in the undergraduate curriculum towards the Computing across the Curriculum Initiative, which was felt to be relevant to the entire curriculum, after which efforts to develop a systematic process of ongoing assessment relative to Program Outcomes were initiated.

Under the current Course Assessment Plan, three to four courses in the program are assessed for their contribution to Program Outcomes each semester. In this manner, each course in the curriculum will be assessed no less frequently than every three years. In order to strike a balance between standardization of the process, to facilitate comparison of results across classes, and flexibility to allow faculty to develop the assessments they felt most comfortable with, the process was delineated as follows:

- 1) During the semester, data is collected on student performance on all questions of

selected tests, assignments or quizzes, or specific items on project rubrics. The ideal is to have this data collected on a continuing basis by the teaching assistant responsible for the class during the semester. Clearly, for large classes it is not practical to collect data on every student response to every question on every assignment and test; for larger classes the instructor identifies those they deem particularly relevant, or may collect data on a smaller, representative sample.

- 2) The instructor links specific data items to specific Program Outcomes based on the knowledge they believe the question or work assesses. A particular question on a test may assess the students' ability to analyze a particular type of problem (say, a hospital emergency room - outcome e) using a specific engineering tool (say, a queuing model - outcomes a, c).
- 3) The instructor establishes criteria by which they can determine that the course contributes to that outcome to a satisfactory degree. Examples of such criteria might be "80% of students will achieve a grade of at least 15/20 on this question", or "all students will participate in an oral presentation and receive direct feedback on their performance."
- 4) The instructor then compiles the results for each outcome to determine whether the proposed criteria were achieved and discusses the results, observing what was successful and what was not as well as directions for improvement the next time the course is taught.
- 5) The Undergraduate Curriculum Committee reviews the Course Assessment results collected each semester at the start of the following semester. Results are discussed with the individual course instructors and also presented to the entire faculty for discussion and input. Follow-up actions related to multiple courses may result from these discussions, such as discussions with outside departments, collection and analysis of additional data to clarify an issue, or changes in course contents and prerequisites. Examples of such actions taken as a result of information collected through the Course Assessment Plan are given under Criterion \$ Continuous Improvement.

This process was introduced in the fall 2008 semester, and has been operating since then. The Department envisions the assessment of all courses through the CAP at most every four years. Table 3-4 summarizes the current implementation plan. Priority has been given to the undergraduate courses over the limited number of graduate courses that are taken by only a few undergraduates at any time. Results from the Course Assessment Plan will be provided in more detail below.

### **Implementation Plan for Course Assessment Program**

<b>Fall 2008</b>	<b>Spring 2009</b>	<b>Fall 2009</b>	<b>Spring 2010</b>	<b>Fall 2010</b>	<b>Spring 2011</b>
ISE110	ISE453	ISE216		ISE330	ISE110
ISE316	ISE443	ISE352		ISE311	ISE408
ISE417	ISE110	ISE361		ISE401	ISE316
ISE498		ISE430		ISE416	ISE498
		ISE452			