Interpreting FE Exam Results to Streamline Outcomes Assessment

Goals/ABET Criteria Addressed
The goals of this presentation are to: 1) make participants aware of the changes that have been incorporated in the new FE Examination; 2) explain how to obtain FE exam results in a format that is useful for outcomes assessment; 3) assist in selection and interpretation of sub-tests in the FE Exam of importance to a specific engineering program; and 4) suggest graphical and statistical methods to streamline interpretation of the FE exam results for outcomes assessment.

In the ABET Criteria for Accrediting Engineering Programs 2002-2003, engineering program outcomes and assessment are the subject of Criterion 3. The assessment measures are to be used in determining how successful the program is in achieving the outcomes important to the educational goals and mission of the institution. In part, the criterion states that one of the possible outcomes assessment measures may include “nationally-normed subject content examinations.” One examination that deals with the subject matter in engineering programs is the Fundamentals of Engineering Examination offered by the National Council of Examiners for Engineering and Surveying (NCEES).

Presentation Format
This session consists of a presentation in an informal lecture style. Since specific examples of examination format and the interpretation of the results by subject content are included, interaction with those attending the session regarding each part of the examination and its results is encouraged. Participants consider examination subjects in light of the emphasis of their own curricula and actively participate in setting the priorities they should establish for their own program in interpreting the FE exam results. Examples are provided of graphical methods to summarize important FE exam results and thereby streamline the assessment process. The session concludes with specific examples of using the evaluation of the FE exam results to improve the engineering program, or "close the loop" of an assessment cycle.

Session Summary
The NCEES Fundamentals of Engineering Examination (FE Exam) has been administered to candidates for professional engineering licensure for many years. The ABET Criteria for Accrediting Engineering Programs 2002-2003 includes Criterion 3, Program Outcomes and Assessment, which reads, in part:

“The assessment process must demonstrate that the outcomes important to the mission of the institution and the objectives of the program, including those listed above, are being measured. Evidence that may be used includes, but is not limited to, the following: student portfolios, including design projects; nationally-normed subject content examinations; alumni surveys that document professional accomplishments and career development activities; employer surveys; and placement data of graduates.”

It is clear that ABET is calling for an assessment process, not just a single examination. But it is also clear that a nationally-normed examination such as the FE examination can be a valuable contribution to assessing outcomes for a program if the examination is properly constructed and if its results are properly applied. Until recently, the FE Exam tested for knowledge of engineering subjects that were common to all disciplines and were primarily found in the first two years of engineering study. The revised FE Exam is different in both content and format.
than the exam administered before October of 1996 and while the candidate pass rate on the FE examination is useful to state boards of registration, the examination reports provide a rich source of information which is available to individual deans and department chairs if they choose to use them to evaluate and improve their programs.

The FE Exam is useful for outcomes assessment to the extent that its content has validity. In this regard, the presentation provides background on how the NCEES arrived at the specifications for the new examination. A task force with membership from NCEES, ASEE, ABET, the Engineering Deans Council (EDC) and NSPE was charged with the development of the specifications for an examination that could be more useful for assessment than the old FE Exam. It was recognized by the sponsoring organizations that such an examination would constitute only one part of a many-faceted assessment process. The focus of the task force was on the development of the knowledge-based specifications for the examination component of the process. Those specifications were subsequently adopted by NCEES and are the basis for the new FE Exam that was first administered in October 1996. The exam specifications for both lower division and the various upper division modules are presented and discussed.

The FE Exam is administered thousands of engineering seniors and recent graduates each year. The results provide both statistically significant comparisons and a rich source of data for deans and department chairs to learn about the performance of their own students in comparison to national norms in specific engineering content areas. The important issue in interpretation of the results is to understand the kind of reports available from the NCEES at no cost to the institution. While simple pass rates are important to the state licensing board and to the individuals seeking licensure, it is the detailed breakdown of the performance of groups of students (such as those enrolled in Electrical Engineering) in specific subject areas (such as in digital system design) that make the new FE Exam a powerful and useful assessment tool to be used along with the other outcomes measures. The presentation features specific examples from both lower division and upper division modules in several disciplines. It also includes methods to use the additional information now provided by NCEES in the newly revised reports that have been changed in direct response to suggestions associated with using the results for outcomes assessment.

**Key Words**
FE Examination, Outcomes Assessment, Licensing Exams, Engineering Exams, EIT

**Bibliography**

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