EDUCATION

Using the Fundamentals of Engineering (FE) Examination as an Outcomes Assessment Tool.

NCEES

advancing licensure for engineers and surveyors

Introduction

Institutions of higher education are increasingly being encouraged to evaluate their academic programs with reference to a national norm or standard. This pressure may be a result of accreditation requirements, or it may come from state legislators who want to assign cost-benefit labels and measure the effectiveness of higher education.

One available program-assessment tool is the NCEES Fundamentals of Engineering (FE) exam. Approximately 55,000 people take this exam each year. Most of them are college seniors within one year of graduating or are recent graduates. Developed to measure minimum technical competence, the FE exam is the first step in the professional licensing of engineers. The exam's design also allows it to be used to assess competency in particular curriculum areas.

Frequently Asked Questions

What content is included in the FE exam, and who prepares it?

The FE exam was developed to evaluate fundamental knowledge of mathematics, applied science, and engineering principles. The FE is administered as seven freestanding, discipline-specific exams: Chemical, Civil, Electrical and Computer, Environmental, Industrial, Mechanical, and Other Disciplines. Each one contains 110 multiple-choice questions and is administered as a computer-based exam at Pearson VUE test centers throughout the country. The FE exam specifications are developed from a survey of faculty from ABET-accredited engineering programs. Actual exam questions are prepared by NCEES volunteers consisting of both licensed practitioners and engineering educators.

What are the advantages of using the FE exam in my institution's outcomes assessment process?

Effective outcomes assessment requires a set of tools to evaluate various aspects of the educational experience. At least some of those tools should enable comparison with other institutions if they are to have any value as benchmarks or credibility on an objective basis. As the only nationally normed exam addressing specific engineering topics, the FE is an extremely effective tool for outcomes assessment. The FE exam allows an institution to focus on specific goals in selected topic areas. The detailed reports of performance by subject area provide information that can help evaluate success in achieving the program's outcomes as specified by ABET. Over time, these reports can also help the program document the effect of curriculum revisions, teaching innovations, and other actions taken to improve student mastery of engineering studies.

What results data is available, and how can my institution obtain it?

NCEES provides an institution- and degree-specific report, known as the Subject Matter Report, which details the performance of

- Currently enrolled students at your institution who take the FE exam (average percentage of correct questions)
- Students nationally (average percentage of correct questions and standard deviation in each topic area)

Using these comparators, programs can gauge their students' performance against national averages or against the performance of students from comparable institutions. NCEES sends these reports to institutions electronically. To find out who is receiving the report for your institution, you can email NCEES at fereports@ncees.org.

Should pass rates be used as a measure of program outcomes?

Pass rates are not a good measure of program outcomes because they are based on a minimum technical competency criterion developed for licensure purposes. A more effective approach is to use data from several administrations to analyze student performance on topics consistent with your program's goals.

What can be done to prompt students to take the exam and to put forth their best effort?

Encouragement by faculty is the most effective technique. Some programs require students to take the exam. Others set up an incentive system, such as paying for the exam if passed or recognizing students who pass the exam.

Won't the use of FE exam results in assessment force all programs to look alike and cause the professor to teach to the exam?

Faculty should select topics and goals relevant to their particular program and use only these in assessment. They should determine the desired performance level based on their curriculum. Because the exam samples only the knowledge in an extensive subdiscipline, it would be impossible to teach to the exam.

For more information on the FE exam contact

Cheryl Warren, Ph.D., P.E.
800-250-3196 ext. 5472
fereports@ncees.org
www.ncees.org

NCEES

National Council of Examiners for Engineering and Surveying®
P.O. Box 1686, Clemson, S.C. 29633
864.654.6824