Engineering Accreditation Board Issues New Criteria

The Accreditation Board for Engineering Technology (ABET) has issued a new set of criteria, Engineering Criteria 2000. The new criteria are being published in January 1998 and phased in over three years, starting in the 1998–99 accreditation cycle. This change has raised concerns about the effect the new criteria could have on mathematics departments.

Established in 1932, ABET is overseen by twenty-two member organizations, including most of the major professional engineering societies in the country. The purpose of ABET accreditation is to identify engineering, engineering technology, and engineering-related degree programs that meet a certain standard of quality. The ABET accreditation process is quite extensive, comprising site visits, interviews with faculty and administrators, and reviews of documentation about the programs. Many mathematicians are familiar with ABET, having been asked by their administrations to supply documentation—some of it very detailed—about the mathematics courses engineering students are required to take. Accreditation is generally granted for six years.

There are 1,430 ABET-accredited degree programs in the U.S. While participation in ABET accreditation is voluntary, most schools consider it a necessity for their engineering programs. As a result, ABET wields considerable influence. University and college administrations take seriously the possibility of withdrawal of ABET accreditation and are often prepared to supply resources to insure that the ABET criteria are fulfilled.

In 1996 ABET undertook a revision of its criteria, which had been in place, with some revisions, since the founding of the organization. The most important change in the new criteria is a shift away from prescribing what engineering programs should be like and a shift toward examining the outcomes of engineering education. The old criteria set standards for things like faculty size, curricular requirements, and the quality of laboratories and other facilities. The new criteria focus far less on such operational details and look instead for the educational objectives of engineering programs and evaluation procedures to track whether objectives are met. For example, one of the new criteria says that engineering programs must demonstrate that their graduates have "an ability to apply knowledge of mathematics, science, and engineering." Evaluation procedures might include asking program graduates and their employers about whether this aim has been achieved.

When it comes to the study of mathematics, neither the old nor the new ABET criteria is very specific. The old criteria had a section devoted to standards for curricular content, which specified that engineering students had to study differential and integral calculus and differential equations. "Encouraged" but not required were probability and statistics, linear algebra, numerical analysis, and advanced calculus. The new criteria are even less specific and do not mention particular mathematics topics, saying only that engineering programs should have "one year of a combination of college level mathematics and basic sciences." ("One year" means a full year's course load, which in a semester system would be 32 semester hours in a 128-semester-hour curriculum.)

Some have been under the impression that at one time ABET required that mathematics courses be taught in mathematics departments and that the new ABET criteria eliminated this requirement. However, according to David Kaufman, the director of the ABET Engineering Accreditation Commission, the ABET criteria never contained any such requirement.

Many mathematics departments have watched with growing concern as engineering schools attempt to shift the teaching of some mathematics courses to engineering departments. A combination of factors underlies this trend, including decreasing engineering enrollment, which leaves engineering departments with more faculty than they need to cover their courses, and dissatisfaction with instruction in mathematics departments. Many mathematicians worry that the new ABET criteria, being so much more vague and flexible than the old ones, could stimulate this trend. Whether such worries are justified is difficult to evaluate. There was nothing in the old criteria to prevent engineering departments from teaching their own mathematics courses, and there is nothing in the new criteria to encourage them in this direction. Kaufman believes that the new criteria will have little influence one way or the other on this dynamic. He predicts that engineering programs will continue to need mathematics departments to teach mathematics courses. Weak ties between a mathematics and engineering department would not be an asset for an engineering department undergoing ABET accreditation review, he noted. In addition, Kaufman points out that one aspect implicit in the new ABET criteria is an interdisciplinary emphasis, which would encourage interactions between mathematics and engineering.

The new ABET criteria have aroused concern not only among mathematicians but among engineers as well. In the past ABET's provision of minimum curricular requirements for an engineering program served as a guide, and some feel betrayed by the withdrawal of this guidance. Kaufman says that ABET would like to encourage more diversity, leaving it up to individual programs to set their own goals. One of ABET's main functions will then be to see whether programs have mechanisms in place to evaluate whether they are achieving their goals. Kaufman does not anticipate many changes in the kind of information that mathematics departments will be asked to provide for the ABET accreditation process under the new criteria.

The AMS Committee on Education has reviewed the new ABET criteria and will continue to monitor possible impacts on mathematics departments. The new and old criteria are available on the ABET Web site, `http://www.abet.ba.md.us/`.

—Allyn Jackson