Mission

All undergraduate engineering programs provide a mission statement in terms of career objectives for their graduates as required for Accreditation Board for Engineering and Technology (ABET) accreditation. These program objectives generally include careers in industry or pursuing further studies in graduate school. Other program objectives may include the ability to obtain professional licensing, or the pursuit of non-engineering professions such as business, law or medicine.

All graduate engineering programs have also provided a mission statement in terms of career objectives for their graduates. For graduates of MS programs, these program objectives generally include advanced technical positions in industry or continued study as PhD candidates. For PhD programs, objectives typically include careers in academic or industrial research.

Program objectives for both undergraduate and graduate programs are developed to satisfy the needs of identified stakeholders. These stakeholders may include prospective and current students, alumni, employers and academic institutions.

Accreditation

All undergraduate engineering programs are currently accredited by the Engineering Accreditation Commission (EAC) or Technology Accreditation Commission (TAC) of ABET. The CSE and CSET programs are also accredited by the ABET Computing Accreditation Commission (CAC). Our current accreditation is valid from Fall 2006 through Summer 2012. Our next self-study report will be submitted Summer 2011 in preparation for a site visit during Fall 2011. No graduate engineering programs have external accreditation.

Learning Outcomes

All undergraduate engineering science programs (BIOE, CHEE, CSE, CVLE, ELCE, INDE and MECE) must demonstrate that their students must meet the following EAC learning outcomes by the time of graduation:

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
All undergraduate engineering technology programs (CET, CSET, EET, ITCE and MET) must demonstrate that their students must meet the following TAC learning outcomes by the time of graduation:

(a) an appropriate mastery of the knowledge, techniques, skills, and modern tools of their disciplines
(b) an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology
(c) an ability to conduct, analyze and interpret experiments, and apply experimental results to improve processes
(d) an ability to apply creativity in the design of systems, components, or processes appropriate to program educational objectives
(e) an ability to function effectively on teams
(f) an ability to identify, analyze and solve technical problems
(g) an ability to communicate effectively
(h) a recognition of the need for, and an ability to engage in lifelong learning
(i) an ability to understand professional, ethical and social responsibilities
(j) a respect for diversity and a knowledge of contemporary professional, societal and global issues
(k) a commitment to quality, timeliness, and continuous improvement

In addition, the undergraduate CSE and CSET programs must demonstrate that their students must meet the following CAC learning outcomes by the time of graduation:

(a) an ability to apply knowledge of computing and mathematics appropriate to the discipline
(b) an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
(c) an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
(d) an ability to function effectively on teams to accomplish a common goal
(e) an understanding of professional, ethical, legal, security and social issues and responsibilities
(f) an ability to communicate effectively with a range of audiences
(g) an ability to analyze the local and global impact of computing on individuals, organizations, and society
(h) recognition of the need for and an ability to engage in continuing professional development
(i) an ability to use current techniques, skills, and tools necessary for computing practice.

All graduate engineering programs also provided learning outcomes for their students. These generally include the ability to master coursework in specialized topics; the ability to teach undergraduate level coursework; and the ability conduct, present and publish peer-review quality research. For both undergraduate and graduate programs, the learning outcomes are designed to insure that graduates will be prepared to achieve program objectives following completion of degree program requirements.
Assessment Process

All undergraduate and graduate engineering programs maintain two levels of assessment to demonstrate that our current students are proficient in meeting learning outcomes, and to demonstrate that our graduates are meeting program objectives.

The assessment of learning outcomes includes collection and analysis of outcome-specific indicators of student performance described below. The results of these performance indicators are regularly reviewed by faculty, such as every semester or every academic year. Following this review, faculty develop recommendations to improve performance in any learning outcomes where student achievement is deemed to be unsatisfactory. Recommendations can range from minor changes in course content to changes in degree program requirements.

The achievement of the program objectives is also reviewed regularly, generally from alumni placement data and other data described below. For this level of review, faculty present these findings to stakeholder representatives such as the Industrial Advisory Council (IAC) and Student Advisory Council (SAC) for their review. Based on the results of these data, and input from stakeholder representatives, recommendations for program changes are discussed at a faculty meeting. In addition to actions similar to those recommended for improving student learning outcomes, recommendations could include increased emphasis on particular course outcomes, changes to course outcomes, or modifications to the program objectives themselves.

Data Collected

All undergraduate and graduate engineering programs collect data for the assessment of learning outcomes and program objectives. The assessment of undergraduate learning outcomes includes objective performance indicators such as average scores on homework or exam problems or standardized test scores. Acceptable performance metrics specified to determine whether or not student performance was satisfactory. For graduate learning outcomes, measures include number of publications; passing rates in qualify exams, proposal defenses and dissertation defenses; and grades or other measures of coursework competency. Subjective performance observations are obtained from student, alumni and co-op employer surveys.

The assessment of program objectives is obtained from alumni placement data, in addition to surveys of alumni and their employers. Additional information is also obtained from standardized test scores and exit surveys. Many graduate programs use information about the number of externally and internally funded graduate students and comparisons of selected metrics from peer programs.

Summary of Findings

All undergraduate engineering programs provided a description and numerical examples of data collected to assess learning outcomes and program objectives as required for ABET accreditation. Although the ITCE program provided information for the assessment of learning outcomes, this program did not provide data for the assessment of program objectives as this is a relatively new program and there have been few graduates from this program to assess. In addition, the INDE program did not provide findings from the assessment of learning outcomes or program objectives. However, this program will graduate its final class during Fall 2010 and is no longer being continued after Fall 2010. Therefore program improvements based on the assessment of learning outcomes or program objectives are no longer required for this program.

All graduate engineering programs also provided a description of data collected to assess learning outcomes and program objectives. In particular, all programs provided a satisfactory
assessments of program objectives. Furthermore, most programs provided data on funding and publications where relevant to learning outcomes. However, numerical examples from other outcome assessment metrics, such as averaged course grades or comparison to peer programs, were not provided and should be presented in future submissions. Also note that data for the assessment of BME PhD program objectives were not provided; this is a relatively new program with only one graduate at the present time. Finally, no data for the assessment of the INDE PhD program objectives or learning outcomes was provided as there are no PhD students currently enrolled in this program and therefore there is no data that can be collected.

Proposed Program Changes

A number of undergraduate and graduate engineering programs have revised courses and/or degree program requirements to improve student learning outcomes and to improve the ability of graduates to achieve program objectives. Other programs made changes to individual courses to improve the ability of faculty to assess student learning outcomes. Some programs, such as the undergraduate CSE and ELCE programs, explicitly listed curricular changes in terms of the learning outcomes and program objectives these changes were designed to address. However, few undergraduate and no graduate programs that made curricular changes provided the rationale for these changes in terms of learning outcomes or program objectives. In future submissions, the rationale for these curricular changes should be provided in terms of the learning outcomes and program objectives these changes are designed to address.

Dissemination of Results

All undergraduate and graduate programs internally disseminate outcome assessment results to faculty on a regular basis. For undergraduate programs, these results are also disseminated to ABET as part of the self study reports, and are typically disseminated to prospective undergraduates and their parents at open houses and other recruiting events. The results of program objectives assessment are disseminated regularly to faculty and to stakeholder representatives such as the SAC and IAC. Improvements to the dissemination of program objective assessment could potentially include the development of web-based dissemination to insure all stakeholders have access to objective assessment results.

Proposed Assessment Changes

The assessment processes adopted by all undergraduate and graduate engineering degree programs meet or exceed the expectations of the University Assessment Committee. There are no plans to change the assessment process for any undergraduate programs. These processes were developed to secure and maintain ABET accreditation. The processes for assessing graduate programs are also satisfactory as described. The only part of this process that may require improvement is in the reporting of assessment results. To improve the reporting of these results, an emphasis will be made to insure that all programs provide numeric examples of their findings for future assessment reports. Furthermore, any curricular changes should be described in the context of how these changes are designed to improve performance with respect to learning outcomes or program objectives. Finally, web-based dissemination of the assessment process and examples of assessment findings may also be implemented.
Program Abbreviations
BIOE  Bioengineering
BME  Biomedical Engineering
CET  Construction Engineering Technology
CHEE  Chemical Engineering
CSE  Computer Science and Engineering
CSET  Computer Science and Engineering Technology
CVLE  Civil Engineering
EET  Electrical Engineering Technology
ELCE  Electrical Engineering
INDE  Industrial Engineering
ITCE  Information Technology
MECE  Mechanical Engineering
MET  Mechanical Engineering Technology

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