

MAE Assessment Process

History of MAE Assessment Processes

In 2009, the ABET Committee provided a general list of required assessment data to the faculty. In 2010, this was followed by a request for more specific data and has been improved on yearly. In 2011, the specific performance indicators for each course were assigned by the faculty and defined on the course syllabi.

The survey data for the graduating seniors and alumni was modified in 2011 to specifically include questions addressing their opinions on being able to meet the performance indicators.

The transition from the collection of paper data to electronic data was made in 2009, relieving a significant burden in archiving and retrieving data in a file structure. This file structure was improved to assist department evaluators in 2010. In 2011 the first attempt was made to identify specific data associated with a given performance indicator. The file-link spreadsheet approach was implemented in 2012, in an effort to improve evaluator's access to the data base.

The Current MAE Assessment Processes

The department's current assessment process is based on four primary, independent tools: 1) instructor evaluations of student classroom work relative to specific performance indicators, 2) graduating senior exit surveys and interviews, 3) the Fundamentals of Engineering exam, and 4) Industrial Advisory Board survey and discussions. The descriptions and frequency of these assessment tools are provided in Table 4-1. We recognize that changes to the curriculum do not always come about as a direct result of these formal assessments. For instance, changes are occasionally based upon independent input from individual faculty, students, and other university units.

Table 4-1. Summary of Primary Assessment Tools

Assessment Tool	Brief Description	Frequency
Instructor Assessment	The performance indicators assigned to the course are evaluated by the course instructor. This data is included in the course notebooks for all required courses.	Completed on an alternating academic year basis.
MAE Seniors Assessment	The department invites seniors to be interviewed and evaluate the curriculum. In addition, each senior completes a survey. This data is	Completed each December and April prior to graduation.

	included in the MAE Seniors Assessment notebook.	
The Fundamentals of Engineering Exam	All students take the FE Exam as administered by the NCEES. This data is included in the Fundamentals of Engineering Notebook.	Completed annually.
Advisory Board Assessment	The advisory board reviews the program and provides qualitative and quantitative feedback. This data is included in the Advisory Board Reviews notebook.	The board meets annually during the spring semester.

All of the tools include an assessment based on a numerical scale ranging from 1 to 5 where the values correlate to meeting student outcomes/performance indicators as indicated below. Note that a minimum value of 3 is considered satisfactory.

1. Very unconfident in meeting student outcome/performance indicator.
2. Unconfident in meeting student outcome/performance indicator.
3. Satisfactory in meeting student outcome/performance indicator.
4. Confident in meeting student outcome/performance indicator.
5. Very confident in meeting student outcome/performance indicator.

In addition, the Instructor, Seniors, and Advisory Board assessment tools contain additional, non-numerical, evaluation mechanisms. Further details of the assessment tools are described below.

1) Instructor Assessment of Course

Each required MAE course has specific student outcomes and associated performance indicators assigned as part of the faculty-approved course syllabi. (Performance indicators are discussed under Criterion 5.) For required courses, the instructor provides an assessment of the class performance on each performance indicator based on the level of attainment using the 1-5 numerical scale. This assessment is generally based on exam and project performances, although depending on the specific class, instructors may take additional data into consideration. A sufficient number of courses are chosen to ensure that each performance indicator is evaluated at least once. Instructors are required to include samples of student work that demonstrate the accuracy of the assessment score.

Beginning with the summer 2014 semester, the department integrated questions regarding the achievement of performance indicators (on a 1-5 scale) into the standard IDEAS-based student class evaluations which are completed on-line near the end of each semester. That is, the IDEAS

student survey will include questions pertaining to the achievement of each performance indicator associated with that course. This student-based assessment data will be included in all subsequent course notebooks with the instructor assessments.

2) MAE Seniors Assessment of Curriculum

The MAE seniors complete an on-line survey that self-assesses their overall achievement of each of the department's student outcomes/performance indicators using the 1-5 numerical scale. The seniors also have an exit interview with the department head and undergraduate program director to express their views and make recommendations regarding the curriculum and program objectives in general. Both the survey numerical scores and the qualitative interview measures are used to assess achievement of student outcomes and performance indicators.

3) Fundamentals of Engineering (FE) Exam

The FE exam is a national exam required for professional licensure and is quite valuable as an assessment tool as it is the only nationally normed test of lower- and upper-level engineering knowledge. The exam is of particular use as an assessment tool for our department since passing this exam is a graduation requirement for our students, which ensures that all students will put forth a strong effort. The exam record provides a quantitative, objective view of students' performance in the fundamentals of engineering in comparison to a large national sample. Annual records comparing the performance of our MAE students with national norms in specific engineering topic areas are collected and summarized. In particular, subject topics from the FE exam are directly mapped to the following *subset* of student outcomes (as recommended by NCEES):

- (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;
- (e) An ability to identify, formulate, and solve engineering problems;
- (f) An understanding of professional and ethical responsibility; and
- (k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Numerical scores ranging from 1 to 5 are assigned based on the student's average percentile in comparison to the national average.

4) Advisory Board Assessment

Members of the Industrial Advisory Board (see Criterion 2 for list of members) meet with the Department on an annual basis during the Spring Semester, either attending the meeting in person at USU, or calling in to participate. The board members review the MAE curriculum and program in general, including the program educational objectives. Several MAE Senior Capstone Design groups also make formal presentations to the Board on their progress to date. This provides the Board with the ability to make a quantitative assessment of our students

technical and presentation skills. The results of the Board meeting are summarized in a letter and provided to the Department Head by the Board Chairman.

At the suggestion of members during the May 2013 Advisory Board Meeting, the Department developed a survey based on the (a-1) student outcomes and associated performance indicators. In particular, the survey asks the Board members to assess the level at which the department's graduates meet our performance indicators. The survey is emailed to the Board members and returned to the department prior to the spring Advisory Board meeting. Not all members will have sufficient familiarity with our graduates to provide definitive feedback, and options to reflect this are included in the survey. We note that the above survey replaced the two-year post-graduation alumni survey that the ABET committee used through its 2013 assessment.