Process For Establishing Program Educational Objectives

The process periodically documents and demonstrates that the Program Educational Objectives are based on the needs of the program’s various constituencies.

**Figure 1. Process for establishing Program Educational Objectives**

Figure 1. outlines the process for establishing Program Educational Objectives as well as a process for fine-tuning them based on the needs of the program’s various constituencies. There are four main constituents: students, Faculty, alumni and employers of our graduates. Their needs are periodically solicited by the Chair’s office using the instruments shown in the figure. The results are tabulated and reported to the Assessment Committee as well as a special Faculty meeting held every two years. In this meeting the Chair of the department as well as the Chair of the assessment committee presents their results to the Faculty as a whole. After discussions, the outcome is to either modify the Program Educational Objectives or keep them as they are.

*It is important to note here that this process is independent of the assessment process, and concentrates only on the needs of the constituents.*
Achievement of Program Educational Objectives

This section describes the assessment and evaluation process that periodically documents and demonstrates the degree to which the Program Educational Objectives are attained.

Figure 2. Process for assessing the achievement of the Program Educational Objectives

Figure 2. outlines the process for assessing the achievement of the Program Educational Objectives as well as a process for making changes based on the results of the assessment. There are three main sources of data: alumni, employers of our graduates and our Industrial Advisory Board (IAB). The Industrial Advisory Board (IAB) are included in the MEEP alumni and employers, and work closely with the department to improve the program. The data is periodically solicited by the Chair’s office using the instruments shown. The results are tabulated and reported to the Assessment Committee. The Chair and the Assessment Committee then report their results to a special Faculty meeting held every two years. In this meeting the Faculty as a whole discuss the assessment results and suggest any changes to the program outcomes. After discussions, a minor outcome is to either modify the Program Outcomes or keep them as they are, but a major outcome is to discuss changes to the ME Program and recommend such changes with a timeline. These special Faculty meetings are held each year; one year to review Program Objectives and the other year to review Program Outcomes and the ME program.
Table 1. Mechanical Engineering Program Educational Objectives

- **Objective 1:** To provide students with the education, the skills and the attributes necessary in such areas as **mathematics and basic sciences** to allow them to successfully compete for quality jobs in all major areas of mechanical engineering, and in all functions of mechanical engineering employment.

- **Objective 2:** To provide students with communication skills, extensive design experience, familiarity with **modern computer and software tools** and the ability to work effectively in a **team environment**. These will ensure their successful integration in the team-oriented industrial workplace, and the timely advancement of their careers.

- **Objective 3:** To provide students **quality laboratory training** and experiences in all major areas of mechanical engineering.

- **Objective 4:** To provide students the broad education necessary to understand the impact of engineering solutions in a **global and societal context**. To accomplish this objective, the general education component of the curriculum places increased emphasis in the areas of humanities and engineering economics.

- **Objective 5:** To equip students with **lifelong learning skills**, which will allow them to successfully adapt to the evolving technologies throughout their professional careers.

- **Objective 6:** To provide students a **solid foundation** in basic sciences and engineering which will allow them to successfully pursue graduate studies.

- **Objective 7:** To provide students the opportunity to experience the unique **inter-disciplinary** feature of the department which includes the Faculty backgrounds and research in the four thrust areas of mechanical systems, thermal sciences, chemical processes, and materials engineering. This is a feature characteristic of the program, designed to provide our graduates with a unique advantage.

- **Objective 8:** To provide students an opportunity to support the **ideal of service** by encouraging them to actively participate in the student chapters of relevant professional societies and extra-curricular activities.

Four assessment tools are used for demonstrating the degree of achievement of the MEEP Program Educational Objectives (PEOs), and helping the department make appropriate changes to the objectives, outcomes and the program itself. These are:

1) IAB Feedback
2) Alumni Surveys
3) Employer surveys
4) Last ABET Review
**PROGRAM OUTCOMES**

**ABET definition:** Program outcomes are narrower statements that describe what students are expected to know and **be able to do by the time of graduation.** These relate to the skills, knowledge, and behaviors that students acquire in their matriculation through the program.

**ABET definition:** Assessment under this criterion is one or more processes that identify, collect, and prepare data to evaluate the achievement of program outcomes.

**ABET definition:** Evaluation under this criterion is one or more processes for interpreting the data and evidence accumulated through assessment practices. Evaluation determines the extent to which program outcomes are being achieved, and results in decisions and actions to improve the program.

**Process for Establishing and Revising Program Outcomes**

**Figure 3. Process Loop for Establishing and Revising Program Outcomes**
Figure 4. Process Flow Diagram for Program Improvement
The **Program Outcomes**:
Table 2 provides the 11 Program Outcomes as well as the keywords for their concise description. The keywords can be used for a quick reference to the actual outcomes.

**Table 2. Mechanical Engineering Program Outcomes (POs)**

<table>
<thead>
<tr>
<th>Outcome Code</th>
<th>Outcome Description</th>
<th>Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME-OUT1</td>
<td>The ability to apply knowledge of mathematics, science and engineering to problem solving</td>
<td>Math &amp; Science</td>
</tr>
<tr>
<td>ME-OUT2</td>
<td>The ability to design and conduct experiments, as well as to analyze and interpret data</td>
<td>Experiments</td>
</tr>
<tr>
<td>ME-OUT3</td>
<td>The ability to design a system, component, or process to meet desired needs within realistic constraints</td>
<td>Design</td>
</tr>
<tr>
<td>ME-OUT4</td>
<td>The ability to function on multi-disciplinary teams</td>
<td>Multi-disciplinary</td>
</tr>
<tr>
<td>ME-OUT5</td>
<td>The ability to identify, formulate and solve engineering problems</td>
<td>Solve engr. problems</td>
</tr>
<tr>
<td>ME-OUT6</td>
<td>An understanding of professional and ethical responsibility</td>
<td>Prof. and ethical</td>
</tr>
<tr>
<td>ME-OUT7</td>
<td>The ability to communicate effectively</td>
<td>Communicate</td>
</tr>
<tr>
<td>ME-OUT8</td>
<td>The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context</td>
<td>Impact of Engr.</td>
</tr>
<tr>
<td>ME-OUT9</td>
<td>A recognition of the need for and an ability to engage in life-long learning</td>
<td>Life-long learning</td>
</tr>
<tr>
<td>ME-OUT10</td>
<td>Knowledge of contemporary issues</td>
<td>Contemporary issues</td>
</tr>
<tr>
<td>ME-OUT11</td>
<td>The ability to use the techniques, skills and modern engineering tools necessary for engineering practice</td>
<td>Modern engr. tools</td>
</tr>
</tbody>
</table>
Information Used for Program Improvement

Ten assessment tools are used for marking the degree of achievement of the MEEP objectives (essentially 4 tools) and outcomes (essentially 8 tools), and helping the department make appropriate changes to the objectives, outcomes and the program itself. Two tools are common for the objectives and outcomes.

These are:

1. Individual Course Folders (For assessing Program Outcomes)
2. Thrust Areas Faculty Feedback (For assessing Program Outcomes)
3. College/University Feedback (For assessing Program Outcomes)
4. IAB Feedback (For assessing Program Objectives and Outcomes)
5. Senior Exit Interview (For assessing Program Outcomes)
6. Alumni Surveys (For assessing Program Objectives and Outcomes)
7. Employer surveys (For assessing Program Objectives and Outcomes)
8. Department Internal Reviews (For assessing Program Outcomes)
9. Last ABET Review (For assessing Program Objectives and Outcomes)
10. FE Results (For assessing Program Outcomes)

Program improvement is typically done under three broad categories:

- Changes in program objectives
- Changes in program outcomes
- Changes in the ME program based on the changes in program objectives, program outcomes and the assessment process.

Changes to the courses and the program were also reviewed and approved.