

Assessment Plan

Chemical and Biological Engineering Department

Updated Spring 2007

Major: Chemical Engineering

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Assessment Management Structure

Our assessment plan is based on three assessment cycles:

1. Inputs Cycle

Our primary inputs are the design of our curriculum, and the design of our courses.

2. Outcomes Cycle

Our outcomes are the “a-k” outcomes prescribed by ABET, plus any locally-defined outcomes. Outcomes are understood to be measurable capabilities at graduation.

3. Objectives Cycle

Our Program Educational Objectives were rewritten in 2006-07 with input from our constituencies (faculty, students, alumni and employers). Objectives are understood to be desirable traits in our graduates in the years after graduation

The review of the results from the various assessment tools is split up to manage workload, but each of these cycles is completed every three years.

Inputs Cycle

Curriculum Review Cycle

Curriculum changes are made after input from our constituencies (faculty, students, alumni and employers) based on assessment results. The following tools are used as part of the overall curriculum review:

- Graduating Senior Surveys
- Alumni Surveys (2 and 4 years after graduation)
- Employer Surveys
- Departmental Advisory Committee input (alumni and employers)
- FE Exam results

Course Review Cycle

Each course is reviewed at least once every three years. The course inputs (syllabus, course outcomes, handout materials) and the results of the Instructional Outcomes Survey for the course are reviewed by a team of faculty, and comments returned to the instructor. The instructor “closes the loop” by describing what changes (if any) will be made to the course as a result of the assessment process.

Outcomes Cycle

Each year a portion of the results of various outcomes assessment tools are reviewed; this is done according to a schedule to ensure that the Outcomes Cycle is completed every three years. Tools used to assess achievement of our program outcomes include:

- Graduating Senior Surveys
- Instructional Outcomes Surveys for selected courses
- Departmental Advisory Committee (DAC) input (alumni and employers)
- FE Exam results
- Student Portfolios

The tool results are reviewed by faculty and members of our DAC. Proposals for curriculum, course, or other changes as a result of outcomes assessment are prepared by faculty, and reviewed (with suggestions for revision, if needed) by members of our DAC and student representatives. Faculty review the suggestions and decide how to implement the change.

Objectives Cycle

Each year a portion of the results of various objectives assessment tools are reviewed; this is done according to a schedule to ensure that the Objectives Cycle is completed every three years. Tools used to assess achievement of our program objectives include:

- Alumni Surveys
- Employer Surveys
- Departmental Advisory Committee (DAC) input (alumni and employers)
- Graduating Senior Surveys

The tool results are reviewed by faculty and members of our DAC. Proposals for changes are typically prepared by faculty, and reviewed (with suggestions for revision, if needed) by members of our DAC and student representatives. Faculty review the suggestions and decide how to implement the change.

In AY 2006-07 the faculty modified the typical approach for a fundamental review of our Program Objectives. There was a desire to have the DAC and students start with a clean slate and propose a set of desired Program Objectives to the faculty. This was done at the February 2007 DAC meeting and the new Program Objectives have been approved by the faculty, and are presented in the next section.

Degree (Program) Objectives

The Degree Objectives are termed Program Objectives in the terminology of our accreditation agency, ABET. Our Program Objectives were proposed by our Departmental Advisory Committee and student representatives, and adopted by the faculty on February 16, 2007.

Our graduates:

- will be confident in their ability to apply chemical engineering fundamentals.
- will be proactive problem solvers.
- will pursue lifelong learning.
- will be effective communicators.
- will be effective team members.
- will be highly ethical engineering professionals.

Expected Competencies

In the terminology of our accreditation agency, the expected competencies are termed Program Outcomes. ABET requires 11, and programs are allowed to add others, or regroup and rephrase ABET's required outcomes. We have elected to simply use ABET's outcomes a through k as our Program Outcomes.

Our graduates will have:

- a. An ability to apply knowledge of math, engineering, and science.
- b. An ability to design and construct experiments.
- c. An ability to design a system, component, or process.
- d. An ability to function on multi-disciplinary 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 and societal context.
- i. A recognition of the need for and ability to engage in life-long learning.
- j. A knowledge of contemporary issues.
- k. An ability to use techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Goals

As part of our Graduating Senior Survey we ask our students to let us know how well we have done in the following areas:

It is our goal to:

- Provide a valuable and useful educational experience to our students.

- Provide excellent instruction.
- Create a "student-friendly" environment.
- Provide state-of-the-art experimental and computational facilities.

Plan for Gathering and Summarizing Data

Because of the small numbers graduating each year, we have found that it is effective to accumulate some data to obtain a more descriptive data set. Because of this we may collect data annually, but only review the accumulated data once every three years. This is indicated in the following table in the Collected and Reviewed columns.

Tool	Use(s)	Collected	Reviewed
Instructional Outcome Survey	<ul style="list-style-type: none"> • Used to assess student perception of how well instructional outcomes are being met. • Used to assess selected program outcomes. 	<p>Some courses are surveyed every semester according to a predefined schedule.</p> <p>Each CHBE course is surveyed once every three years.</p>	Each course is reviewed once every three years according to a predefined schedule.
Course Notebooks	<ul style="list-style-type: none"> • Used to assess the inputs to a course to see if stated instructional outcomes are consistent with course materials. • Used to assess whether the program outcomes tied to the course are consistent with the course content. 	<p>Some courses are reviewed every semester according to a predefined schedule.</p> <p>Each CHBE course is reviewed once every three years.</p>	Each course is reviewed once every three years according to a predefined schedule.
Graduating Senior Survey	<ul style="list-style-type: none"> • Used to assess program outcomes. 	Collected annually. Each senior design group is asked to complete the survey.	<p>Each design group meets with either the department head or the DAC to go over their survey responses.</p> <p>Collected survey responses are reviewed once every three years.</p>

Alumni Survey	<ul style="list-style-type: none"> Used to assess program objectives. 	Alumni 2 and 4 years after graduation are surveyed every summer.	Collected survey responses are reviewed once every three years.
Employer Survey	<ul style="list-style-type: none"> Used to assess program objectives. 	Employers of alumni 2 and 4 years after graduation are surveyed every summer.	Collected survey responses are reviewed once every three years.
DAC Input	<ul style="list-style-type: none"> Used to assess program outcomes and objectives. 	DAC (alumni and employers) meets annually.	DAC is assigned a subset of all review tasks each year (complete cycle after three years), but their feedback on all aspects of our program is welcome.
FE Exam	<ul style="list-style-type: none"> Used to assess program outcomes. 	Collected each semester.	Reviewed once every three years.
Student Portfolio	<ul style="list-style-type: none"> Used to assess program outcomes 	Specific assignments are collected to demonstrate particular outcomes	Complete portfolio contents will have been reviewed every three years.

Plan for Utilizing Data

The data from each of the assessment tools feeds into one or more of the assessment cycles.

For the Course Review portion of the Inputs Cycle, faculty review teams assess the course materials and instructional outcomes survey results and provide feedback to the instructor. For changes with larger scope, such as curriculum changes or revision of program objectives, suggestions for change can come from faculty, DAC members, or students. Then proposals for change are typically generated by the faculty, and reviewed (with suggestions for revisions, if needed) by the DAC and student representatives. After the faculty have reviewed the DAC and student suggestions, an implementation plan is developed by the department head with the faculty.

Each of the assessment cycles repeats annually, but the targets of assessment change according to a predefined schedule to ensure a complete review is accomplished every three years.

The major annual assessment events include:

- Faculty Retreat, every Fall
- Faculty meetings, approximately bi-weekly throughout the academic year
- DAC meeting, every Spring – the DAC meets with the faculty and with student representatives
- Student mass meeting (when a proposal is pending for student review) – Spring

ChBE ANNUAL ASSESSMENT CYCLE

Objectives Loop

(Major ABET Contributor)

Input from

- Faculty
- Technical Advisory Committee
- Students

Assessed by

- Faculty
- Technical Advisory Committee

Proposed Changes

- Faculty

Reviewed, Input from

- Technical Advisory Committee
- Students

Final changes

- Faculty

Outcomes Loop

(Major ABET Contributor)

Data includes

- Student Portfolios
- Senior Exit Interviews
- FE Exam Results
- Course Outcomes Surveys
- Alumni and Employer Surveys

Assessed By

- Faculty
- Technical Advisory Committee

Proposed Changes

- Faculty

Proposed Changes Reviewed, Input from

- Technical Advisory Committee
- Students

Final Changes

- Faculty

Inputs Loop

(Minor ABET Contributor)

Course Notebooks:

- prepared by instructors
- assessed by faculty teams
- returned to instructors

Instructors close the loop