

IDEAL SM

CRITERIA 2, 3, and 4 ONLY

Self-Study Report

(Intro excerpted from Criterion 1)

**General Engineering Technology
Bachelor of Science
Upper State University**

July 1, 2014

**Self-Study Report
Engineering Technology Program
Bachelor of Science
Upper State University**

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Program History

The Engineering Technology program at Upper State University is a general engineering technology program that serves the regional economy of Northern Upper State, Anystate, USA. The program has been in existence since 1978.

Options

Students may complete a program in Engineering Technology with options in one of four areas: Civil Engineering Technology, Chemical Engineering Technology, Electrical Engineering Technology, and Mechanical Engineering Technology. The degree conferred is the B.S. in Engineering Technology with an option in one of these four areas if the student has satisfied the relevant option requirements. The option is noted on the student transcript, but is not indicated on the degree conferred.

Organizational Structure

The Upper State University Engineering Program resides in the College of Natural Science and Engineering Technology (CNSET), and has its own dean who reports directly to the provost of the university.

Program Delivery Modes

The engineering technology program is offered in the day mode only with courses offered in traditional lecture/laboratory style. All students are required to spend a minimum of one semester in a cooperative education or internship position. There is currently no significant distance education or web-based component in the program.

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Self-Study Report

State University Engineering Technology Program Bachelor of Science Upper State University

The Upper State University Engineering Technology Program resides in the College of Natural Science and Engineering Technology (CNSET), and has its own dean who reports directly to the provost of the university. The program has been in existence since 1978.

Criterion 1. Students

Admission into the College of Natural Science and Engineering Technology

All Upper-State University (USU) freshman Engineering Technology students are admitted and dually enrolled in the Undergraduate University Division (UUD) and the College of Natural Science and Engineering Technology (CNSET). The following requirements must be met for admission:

1. Cumulative high school grade point average of 2.5 or higher on a 4.0 point scale
2. Ranked in the top half of high school graduating class
3. SAT composite score of at least 950 or ACT composite of 20 or above.

Exceptions to these standards may be made on an individual basis and are reviewed by the Admissions Office. Those who are admitted on this basis may be required to take remedial work during their first year at Upper State University. Credits in remedial courses are not applied to graduation requirements.

Table 1-1. History of Admissions Standards for Freshmen Admissions for Past Five Years

Academic Year	Composite ACT		Percentile Rank in High School		Number of New Students Enrolled
	Minimum	Average	Minimum	Average	
2009-2010	21	24	52%	76%	100
2010-2011	22	25	55%	78%	95
2011-2012	20	23	50%	70%	113
2012-2013	23	26	51%	75%	99
2013-2014	24	27	55%	72%	107
2014-2015	24	27	56%	70%	110

Since the last accreditation visit, student enrollment in the Engineering Technology program has nearly doubled. Enrollment figures for the past six academic years are shown in the table below:

Table 1-2. Enrollment Trends for Past Five Academic Years

	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Full-Time Students	316	325	360	365	390
Part-Time Students	25	20	28	32	29
Student FTE	328	335	375	380	415
Graduates	60	68	90	88	101

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Criterion 2. Program Educational Objectives

The Engineering Technology Program at Upper State University has accepted and implemented the use of the term “objectives” as described in the ABET Engineering Technology Criteria for 2014-15. Hence, the objectives are broad statements that describe the career and professional accomplishments that the faculty of the Engineering Technology program at USU are preparing graduates to achieve.

Mission

Institutional Mission

In its one hundred year history, Upper State University has been a leader in educating the people of this state. In continuation of this rich tradition, Upper State University maintains its commitment to advancing knowledge and serving a worldwide society. USU is committed to providing access to quality education and expert knowledge, to promoting scholarship and problem solving to address the needs of a global society, to advancing diversity both on our campus and within the community, and to making people matter.

College of Engineering Technology and Natural Science Mission Statement

The CNSET will produce science and engineering technology graduates who are able to integrate theoretical knowledge and practical application as productive citizens in an ever-changing technological world. The CNSET graduate will have the skills to be a productive member of the community, to work in an interdisciplinary framework, and will have an appreciation of the effect of their work on the global society.

USU Engineering Technology Program Objectives

The Program Educational Objectives of the USU Engineering Technology program have existed in a formal document since 1993. The objectives have undergone three revisions, most notably in the latest version written to conform with ABET definitions and evaluation requirements. The program educational objectives are published in our on-line undergraduate catalog (www.usu.edu/ugcatalog), in college brochures, in recruiting literature, and are posted in our building in various display cases. The program educational objectives for the USU Engineering Technology Program are as follows:

The USU Engineering Technology Program will enable its graduates to

1. Be effective in engineering design and the practical application of engineering theory
2. Effectively lead, work and communicate in cross-functional teams
3. Conduct themselves with high standards of ethics
4. Be successfully employed in an engineering technology position or accepted into graduate programs
5. Expand their knowledge and capabilities through continuing education or other lifelong learning experiences
6. Serve their communities, whether locally, nationally, or globally.

Consistency with the College and Institutional Mission Statements

The program educational objectives for engineering technology at USU support the missions of the institution and of the college. As has been noted above, the University mission is one of providing access to quality education and expert knowledge, to promoting scholarship and problem solving to address the needs of a global society, to advancing diversity both on our campus and within the community, and to making people matter. In support of this institutional mission, the CNSE has adopted a mission that is focused on producing science and engineering technology graduates who are able to integrate theoretical knowledge and practical application as productive citizens in an ever-changing technological world. Graduates of the CNSET programs are expected have the skills to be a productive member of the community, to work in an interdisciplinary and global framework, and will have an appreciation of the effect of their work on the global society.

The program educational objectives listed above are focused on attributes of the graduates that enable them to fulfill the vision that is found in the mission of the University and the mission of the CNSET.

Program Constituencies

The principal constituencies of the Engineering Technology program are:

- Engineering technology faculty,
- Current engineering technology students,
- Alumni,
- Major donors, and
- Employers.

Process to Establish Program Educational Objectives

The overall process to determine and approve the current version of the Program Educational Objectives (PEOs) began in the summer of 2004. A first draft of the program educational objectives was presented in early fall by the Curriculum Committee—a representative body of faculty, advisors, and students. All engineering technology faculty were invited to edit the proposed PEOs; about 50% of the faculty responded. The second draft was presented to our Advisory Council (industrial and alumni advisory board) for comments. While on campus for the fall semester Career Fair (November, 2005), 10 representatives of major employers participated in a lunchtime focus group during which the PEOs were evaluated and discussed. Copies of the PEOs had been distributed to the employer representatives about two weeks in advance of the focus group meeting. Given the input from all of these sources, the final version of the Program Educational Objectives was approved by a unanimous vote of the faculty in April, 2007.

Whether the evaluation of PEOs suggests a need for their revision or not, the following table summarizes the scheduling of constituent input to PEOs:

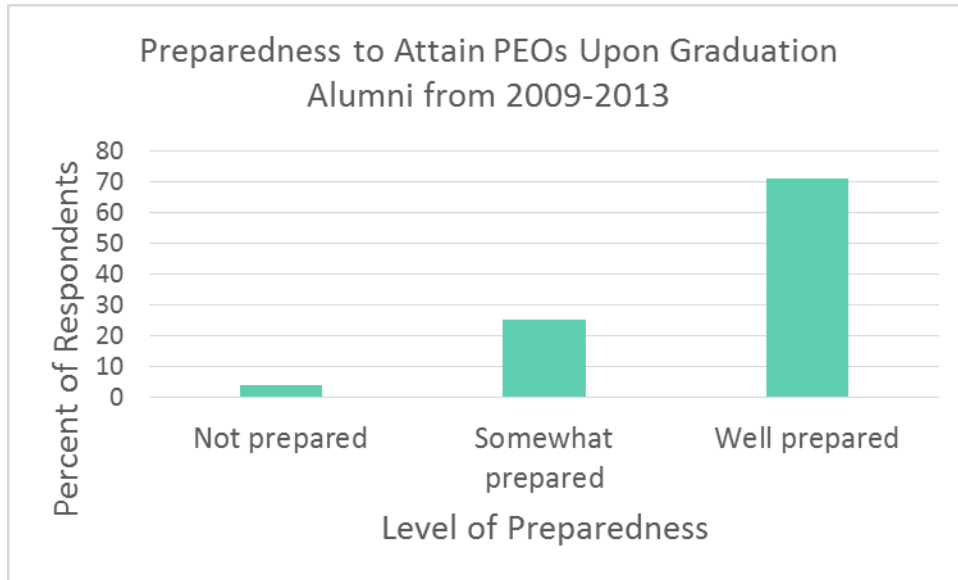
Table 2.1 Summary of Constituent Input to PEOs

Input Method	Schedule	Constituent
Alumni survey	Every three years	Alumni 2-5 years out
Employer focus group	Every two years during Career Fair	Employers (and recruiters); some are alumni
Advisory Council discussions	As needed—available annually	Industrial representatives, employers, alumni
Curriculum Committee meetings	Available as frequently as needed	Faculty and students

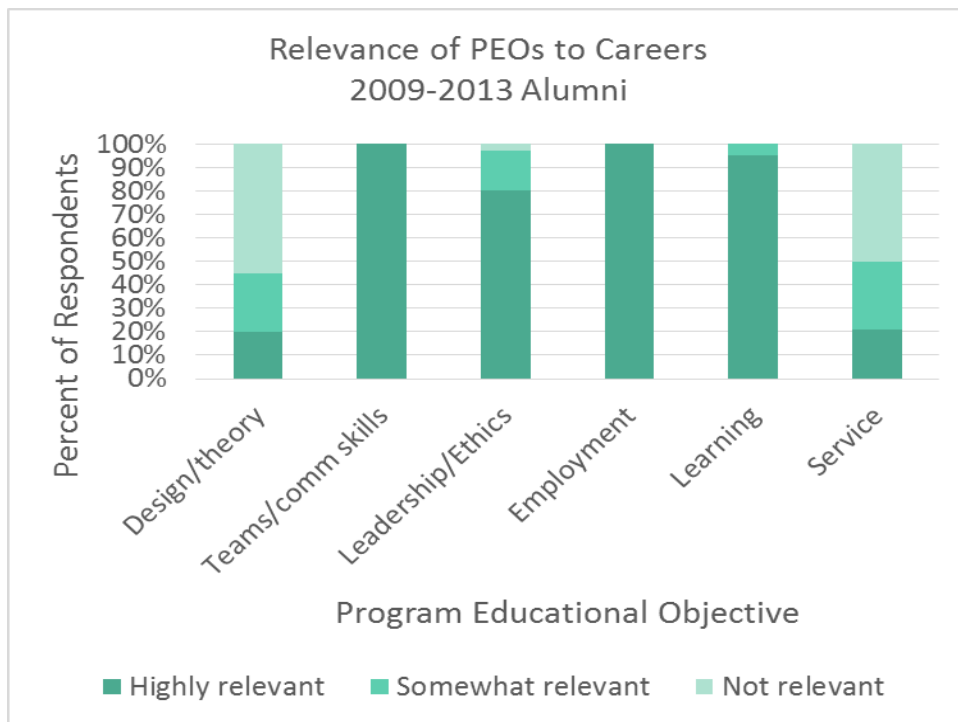
Process for Review of the Program Educational Objectives

A similar process used to establish the PEOs is used every three years for their review. Alumni are contacted via a LinkedIn group of college alumni that is hosted by our career services unit. A link to the survey is provided to the alumni. The survey asks alumni from two to five years post-graduation about both their preparedness as graduate of our program in attaining the PEOs, and about the relevance of the PEOs to their careers. LinkedIn allows alumni to be sorted by graduation date.

Results of the most recent survey in Spring, 2014 indicate that 96% of graduates feel either somewhat prepared or well prepared to attain the Program Educational Objectives in their careers.



Next, when asked whether they felt that the PEOs were relevant to their careers, alumni responded that they felt that all PEOs were highly relevant to their careers with the exception of Design/Theory (#1) and the Service PEOs (#6).



These results were presented to the advisory council, which recommended that the design/theory (#1) and service (#6) PEOs be kept intact and that they were important in the careers of engineers. They suggested that the responses were due to the particular transitory nature of employment over the period of hiring of these alumni. The faculty accepted the recommendations of the Advisory Council, and the six PEOs were kept intact. The minutes of this meeting are included in the appendix.

Criterion 3. Student Outcomes

Process for the Establishment and Revision of the Student Outcomes

The Engineering Technology Student Outcomes match closely to the ABET-designated outcomes. All outcomes have been agreed upon by the faculty and have been operationalized through a process in which each Engineering Technology faculty member analyzed the courses that s/he has taught over the last three years and assigned a weighting on the degree to which each outcome was supported by course material. This was facilitated by providing the faculty member a definition of each outcome to help identify its potential coverage in any given course.

The outcomes reflect the ABET-designated outcomes but have been reorganized slightly into a logical grouping of the knowledge and skills that are subsets of each outcome. We have also adopted the Engineering Technology Criteria definition of outcomes as narrower statements that describe what students are expected to know or be able to do by the time of graduation from our program.

The outcomes are reviewed for relevance on a three-year cycle along with the review of the Program Educational Objectives.

Student Outcomes

The eleven Student Outcomes for the Engineering Technology program at Upper State University are listed below.

1. an ability to identify, formulate, and solve engineering technology problems
 - a) an ability to apply knowledge of mathematics, science, and engineering
 - b) an ability to use the techniques, skills, and modern technical tools necessary for engineering technology practice.
2. an ability to conduct, analyze and interpret experiments and apply experimental results to improve processes,
3. an ability to apply creativity in the design of systems, components or processes appropriate to program objectives,
4. an ability to function effectively on teams and a respect for diversity
5. an ability to understand professional, ethical and social responsibilities; personal continuous improvement
6. an ability to communicate effectively, both orally and in writing
7. the broad education necessary to understand the impact of engineering technology solutions in a global and societal context
8. a recognition of the need for, and an ability to engage in life-long learning
9. a knowledge of contemporary issues

Relationship of Student Outcomes to Program Educational Objectives

Table 3.1 shows how the student outcomes support the achievement of our program educational objectives when the skills, knowledge and attitudes learned by students in our academic program are put into practice in the workplace or in post-graduate study. The course syllabi (Appendix X) contain examples of the strategies that are implemented in our Engineering Technology courses in order to provide learning opportunities in the outcomes areas.

Table 3.1 Relationship of PEOs to Student Outcomes

Program Educational Objectives	Supporting ABET Student Outcomes
Be effective in engineering design and the practical application of engineering theory	1. an ability to identify, analyze and solve technical problems, 1a. an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology, 1b. an appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines, 2. an ability to conduct, analyze and interpret experiments and apply experimental results to improve processes, 3. an ability to apply creativity in the design of systems, components or processes appropriate to program objectives
Effectively lead, work and communicate in cross functional teams	4. an ability to function effectively on teams and respect diversity, 6. ability to communicate effectively
Conduct themselves with high standards of ethics	5. an ability to understand professional, ethical and social responsibilities, 4, 5, 9. a respect for diversity and a knowledge of contemporary professional, societal and global issues
Be successfully employed in an engineering technology position or accepted into graduate programs	1. an ability to identify, analyze and solve technical problems, 4, 7. a respect for diversity and a knowledge of contemporary professional, societal and global issues 5. an ability to understand professional, ethical and social responsibilities 6. an ability to communicate effectively, 8. a recognition of the need for, and an ability to engage in lifelong learning
Expand their knowledge and capabilities through continuing education or other lifelong learning experiences	5. an ability to understand professional, ethical and social responsibilities, 7. a respect for diversity and a knowledge of contemporary professional, societal and global issues 8. a recognition of the need for, and an ability to engage in lifelong learning
Serve the community, whether locally, nationally, or globally.	4. a respect for diversity 5. an ability to understand professional, ethical and social responsibilities, 8. a recognition of the need for, and an ability to engage in lifelong learning

Relationship of courses in the curriculum to the Student Outcomes—Curriculum Map

Table 3.2 shows the definitions of each outcome for the Engineering Technology program, and Table 3.3a and Table 3.3b (for option courses) demonstrate where these outcomes are operationalized in our curriculum. Since Engineering Technology faculty only have a direct influence on the courses taught within our program, the coverage of all student outcomes is guaranteed in the ET courses alone. Student study in math and basic sciences enhances achievement of outcomes, but Engineering Technology faculty members have no consistent ability to influence change in courses taught outside of our program.

Table 3.2 Definitions of Student Outcomes

Program Outcome	Working Definition
Engineering Technology problem-solving	Use of sound reasoning, Engineering Technology analysis, creativity, and judgment to identify problems and formulate solutions both for well-defined and ill-defined problems
>Application of math & science	Understanding and properly applying principles from math and science to technical problems
>Use of Engineering Technology tools	Using appropriate Engineering Technology tools and techniques, including computational hardware and software, to simplify or automate problem solving (e.g., iterative calculations)
Design & conduct experiments/analyze data	Designing and conducting experiments to test hypotheses, to understand component function, or to investigate phenomena/ using appropriate interpretive methods (graphical, statistical, etc.) to understand data, analyze trends, and draw conclusions
Design component, system, process	The often iterative process of devising a system, component or process, in which basic sciences, math, and technology are applied to convert resources optimally and within constraints to meet stated needs
Team work (multidisciplinary) and diversity	Two or more individuals from different disciplines working together toward successful completion of a mutual objective; the skills needed to work in such an environment
Professionalism and ethics	Recognizing the need for an ethical response to a problem or issue and then acting in a manner consistent with integrity, moral standards, and codes of ethics
Communication skills	Efficient and effective writing, speaking, and presenting of concepts and results of a project in an understandable manner to an audience of one or more people
Global and societal context of Engineering Technology	Understanding the effect of Engineering Technology solutions on the local, national, and global community
Lifelong learning skills	Pursuing and maintaining currency of knowledge and professional needs; continually improving
Knowledge of contemporary issues	Exhibiting knowledge of current issues that apply to the discipline and being able to intelligently discuss world happenings

Table 3.3a Outcomes Mapping for ET Courses

Outcome	1010	1015	1011	2001	2010	2015	2020	2040	2060	3001	3010	3013	3030	3050	4001	4090	4092
1. Problem-solving																	
a) Math, science, technical knowledge																	
b) Tech. Tools																	
2. Conduct & analyze experiments																	
3. Apply knowledge for creative solutions to probs.																	
4. Teams & diversity																	
5. Ethics and Prof.																	
6. Comm. Skills	Oral		Oral & written	Oral & written						Oral & written				Oral & written		Written	Oral & written
7. Global and societal contxt.																	

8. Lifelong learning	■	□	□	■	□	□	□	□	□	■	□	□	■	□	■	□	■
9. Contemp. Issues	□	□	■	■	□	□	□	■	□	■	□	■	□	□	■	□	■

Table 3.3b Outcomes Mapping for Option Courses

Outcome	Chemical Eng. Technology					Civil Eng. Technology				
	2021	3022	3024	4060	4081	2033	2034	3033	4032	4034
1. Problem-solving										
a) Math, science, technical knowledge										
b) Tech. Tools										
2. Conduct & analyze experiments										
3. Apply knowledge for creative solutions to probs.										
4. Teams & diversity										
5. Ethics and Prof.										
6. Comm. Skills										
7. Global and societal contxt.										
8. Lifelong learning										
9. Contemp. Issues										

Table 3.3b Outcomes for Option Courses (continued)

	<i>Mechanical Eng. Technology</i>					<i>Electrical Eng. Technology</i>				
Outcome	3042	3044	4008	4042	4044	2052	3056	4045	4056	4058
1. Problem-solving										
a) Math, science, technical knowledge										
b) Tech. Tools										
2. Conduct & analyze experiments										
3. Apply knowledge for creative solutions to probs.										
4. Teams & diversity										
5. Ethics and Prof.										
6. Comm. Skills										
7. Global and societal contxt.										
8. Lifelong learning										
9. Contemp. Issues										

Documentation

During the campus visit, course materials will be displayed by course including syllabi, examples of graded student work, and textbooks. Assignments and student papers within each course will be organized to demonstrate how coursework addressed the outcomes relevant to the course, as listed in the tables above.

Achievement of Student Outcomes

This information will be presented in the next section, Continuous Improvement.

Criterion 4. Continuous Improvement

Assessment of Student Outcomes

Faculty accountability in teaching toward the achievement of their course outcomes according to the outcomes shown on Tables 3.3a and 3.3b is supported by their submission of semester Faculty Course Reports (FCRs) in which they give a written account of student learning and the student survey outcomes assessment results. The reporting forms are available for faculty as automated forms on the web. Faculty responsibilities for an entire cycle of assessment are shown on Table 4.1.

The curriculum is the chief means by which strategies are implemented for student learning to support outcomes and, ultimately, objectives. Co-curricular activities do not involve all students equally, and assessment of outcomes is difficult in such diverse conditions. Therefore, our program has focused its attention on the Engineering Technology courses for the learning needed for students to be able to demonstrate the required outcomes AND for outcomes assessment. This learning is distributed across the undergraduate curriculum, as was shown in Table 3.3. While all outcomes may not be covered in each course, when integrated across the curriculum (including the options), students are exposed to learning strategies for all ABET- and CNET-designated outcomes.

Table 4.1 Timetable of Faculty Responsibilities in Outcomes Assessment	
Process Time	Activity
Late summer/late fall	<ol style="list-style-type: none"> 1. Review course outcomes and previous FCRs 2. Incorporate any changes for improvement
Fall/Spring	Conduct and record student assessment for designated outcomes Spring: Annual Faculty Reviews
End of semester	<ol style="list-style-type: none"> 1. Conduct USU evaluations 2. Complete FCRs <ul style="list-style-type: none"> • Include USU survey data and direct assessment results 3. Curr. Comm. FCRs) for all courses
Late Spring semester	<ol style="list-style-type: none"> 1. Web-based survey 2. Senior exit interview 3. Co-op surveys
Early Summer	Collation of assessment results (ABET Coordinator)
Early to Mid-Summer	Meeting of Curriculum Committee to discuss analysis results; make recommendations
Mid- to Late Summer	Recommendations to faculty Suggest changes for curriculum and program improvement

The program's assessment plan uses multiple measures of student outcomes at both the program and institutional level. The outcomes assessment tools used include the following and are described in more detail on Table 4.2b:

- Course survey (program level)
- Year-End survey (program level)
- Senior Exit Interview (program level)
- Co-operative Education Surveys (college level)
- Alumni Survey (institutional with questions added by program)
- CNET Student Survey

Because of the small student-to-faculty ratio (roughly 16:1), the program faculty members believe that they have a good knowledge of individual student accomplishments and are able to make accurate judgments on the results of the assessment. Where possible, administration of these assessment instruments is staggered throughout the year to avoid respondent "burnout." Even though all outcomes are not assessed each semester, when integrated over the regular cycle, all outcomes are assessed at some point in the curriculum, as shown in Table 4.3a. The outcomes to which faculty have assigned lower priority are assessed less frequently.

Some of the assessment tools listed in Table 4.2b have been in place for the past ten years. These assessment instruments include those designed specifically for the Engineering Technology program and those administered by the institution. Table 4.3 shows that assessment of all outcomes is covered by the administration of the tools listed above and in these tables. All assessment tool results are based on or converted to a 5-point scale with 5 being high.

Evaluation of Student Outcomes

These assessment instruments listed on Table 4.3b have yielded valuable quantitative and qualitative information about the extent to which student outcomes are achieved by our students at the time of graduation. An underlying assumption is that if achievement of outcomes is demonstrated at a point before graduation, then students will not "lose" the proficiency in their remaining undergraduate years. However, since the assessment tools also provide longitudinal data on the development of student performance through the curriculum, these data help identify opportunities for reinforcement of the outcome learning areas.

Integrated results of outcomes assessment are presented in Table 4.4. Given the nature of our student body and their areas of employment, our threshold for student performance is that, by the time of graduation, **67% of the students perform at level of 3.5/5.0 scale or better** for each outcome. The areas highlighted (and underlined) on Table 4.4 show areas of potential weakness in outcomes performance by students.

Table 4.2a Assessment Cycle (shading indicates assessment)

Outcome	2008-09			2009-10			2010-11		
	2011-12			2012-13			2013-14		
1. Problem-solving									
a) Math, science, technical knowledge									
b) Tech. Tools									
2. Conduct & analyze experiments									
3. Apply knowledge for creative solutions to probs.									
4. Teams & diversity									
5. Ethics and Prof.									
6. Comm. Skills									
7. Global and societal contxt.									
8. Lifelong learning									
9. Contemp. Issues									

Table 4.2b Assessment Tools

Tool	Description	Frequency	Last administered
Course survey reported on FCR	Developed by and required by the university, this survey asks students to rate their courses; additional questions added by the Engineering Technology Department query students on their performance in each of the course outcomes	Each semester for all courses	As of the time of this writing, at the end of the Fall, 2014 semester
Year-End survey	Also developed by the Engineering Technology Department, this survey is web-based and is given to students in the four seminar courses. Questions deal with their self-evaluation of performance in the 12 Engineering Technology outcomes as integrated over the courses they have taken thus far.	Each year in the seminar courses (in the Engineering Technology Graphics and Design course for 1 st -year students)	Fall, 2013, Spring, 2014
Senior Exit Interview	This interview is conducted by one of the advisors; faculty members are not present. Although the main purpose of this interview is not to assess outcomes, qualitative data on student attitudes toward the program are obtained.	Each year, April in the 2 nd -last week of classes	April, 2014
Co-operative Education Surveys	The Cooperative Education Program administers surveys to the co-op and internship students. The surveys are geared towards the student outcomes, and the results are easily and directly incorporated into our review process.	Three times a year after each semester (including summer).	April, 2014
Alumni Survey	While the main purpose of this survey is to gather information on achievement of objectives, this survey also asks for a retrospective view of a graduates performance in each of the twelve outcomes relative to the importance of each outcome in the workplace	Biannually to a targeted audience of alumni 2-4 years post-graduation	March, 2013
CNSET Student Survey	This survey was developed nationally and consists of a variety of questions designed to assess student attitudes in multiple domains, as well as their perceptions of their skills and educational experience. Only seniors participate. This instrument has not provided meaningful data, and is being dropped from the assessment toolkit.	Annually, January	January, 2014

Table 4.3 Coverage of Outcomes by Assessment Tools

Outcome/Tool	Course Surveys	Year-End Student Survey	Senior Exit Interview	Co-op Survey	Alumni Survey	CNSET Student Survey
Tech. Problems	✘	✘	✘	✘	✘	
Math, science, & technology	✘	✘	✘	✘	✘	
Technical tools	✘	✘	✘	✘	✘	
Conduct & analyze experiments	✘	✘	✘	✘	✘	
Creativity in system implementation	✘	✘	✘	✘	✘	
Comm. skills	✘	✘	✘	✘	✘	✘
Ethics/Prof	✘	✘	✘	✘	✘	✘
Teamwork/diversity	✘	✘	✘	✘	✘	✘
Global & societal context	✘	✘	✘		✘	✘
Life-long learning	✘	✘	✘		✘	✘
Contemp. issues	✘	✘	✘		✘	✘

Table 4.4 Integrated Outcomes Assessment Results 2013-2014 Academic Year
(highlighted & underlined values fall below threshold and are points that have been considered)

Outcome/ Assessment Tool	Year-End Student Survey (by year)	Senior Exit Interview	Co-op Survey (all students)	Alumni Survey	Course Surveys (averages for each AY)
	Percent of Respondents at or Above 3.5 Performance Level				
Technology Problems	F=50% S=70% Jr=75% Sr= <u>60%</u>	83%	75%	85%	F=80% S=75% Jr=85% Sr=80%
Math, science, & technology	F=30% S=42% Jr=75% Sr=72%	75%	80%	<u>55%</u>	F=65% S=78% Jr=82% Sr=75%
Technical. tools	F=25% S=54% Jr=80% Sr=90%	93%	90%	85%	F=65% S=72% Jr=85% Sr=90%
Conduct & analyze experiments	F=5% S=26% Jr=53% Sr=89%	95%	<u>50%</u>	75%	F=35% S=58% Jr=67% Sr=85%
Creativity in system implementation	F=7% S=16% Jr=54% Sr=89%	100%	75%	85%	F=25% S=55% Jr=75% Sr=95%
Teamwork and diversity	F=68% S=75% Jr=87% Sr=98%	75%	75%	90%	F=25% S=35% Jr=65% Sr=80%
Ethics/Prof	F=57% S=40% Jr=68% Sr=86%	85%	<u>45%</u>	<u>35%</u>	F=85% S=75% Jr=75% Sr=95%
Comm. skills					
Oral	Fr=78% Sr=80% Jr=54% Sr=90%	85%	75%	85%	F=55% S=75% Jr=85% Sr=95%
Written	F=89% S=57% Jr=67% Sr=90%	90%	<u>60%</u>	<u>55%</u>	F=60% S=25% Jr=45% <u>Sr=55%</u>
Global & societal context	F=20% S=35% Jr=33% <u>Sr=65%</u>	<u>65%</u>		<u>60%</u>	F=25% S=43% Jr=67% Sr=87%
Life-long learning	F=27% S=55% Jr=78% Sr=89%	75%		85%	F=20% S=55% Jr=84% Sr=95%
Contemp. issues	F=10% S=24% Jr=56% <u>Sr=56%</u>	75%		<u>55%</u>	F=34% S=55% Jr=78% Sr=96%

Continuous Improvement of the Program

Tables similar to Table 4.4 for each assessment cycles are presented in the Appendix Q. These tables show that assessed student performance in writing and in the application of mathematics and science to engineering technology problem-solving have been weak in the past (2009-10, 2010-11, and 2012-13). This section discusses actions taken to remedy these weaknesses and the results of those actions. Other weaknesses are highlighted in the appendix tables, but in some cases, only one of the several assessment instruments indicates a weakness. In other cases (ethics and professionalism, contemporary issues, global and societal context), the weaknesses have appeared for the first time. In addition, for the sub-threshold performance in the global and societal context outcome, the results are very near the threshold and have been placed on “hold.” Decisions on whether course or program changes are necessary are guided by the Curriculum Committee, faculty judgment, and the validation of results from several assessment sources. Indication of poor performance from one assessment tool may not justify the need for changes. *Recurrence* of weaknesses, even if in the results from one instrument, is given closer scrutiny.

Applications of mathematics & science to engineering technology problems

To improve student performance in these areas, a linear algebra course was removed from the program in the Fall of 2011, and replaced by MTH 3030, Calculus II and Differential Equations. The change allowed the students to apply mathematics in the context of Engineering Technology soon after they had completed their core of math courses. The linear algebra course contained no explicit Engineering Technology content.

Table 4.4 shows an improvement in math skills as the measures exceed the threshold in all but the alumni category. Given that most of the alumni surveyed would have taken the linear algebra course rather than the applied math course, the alumni response is consistent with the weaknesses of the earlier course sequence. The results in the tables for 2011-12 and 2012-13 are also consistent with the fact that students already in the program were allowed to continue in the original curriculum into which they matriculated into the university, i.e., many took the linear algebra course rather than the applied mathematics course.

Results of the year-end surveys show improvement in the students’ ability to apply math from the freshman year on to the senior year with a peak in the junior year—the year in which students took the calculus/differential equations course.

Ability to communicate effectively in writing

We assess oral and written communication skills in separate queries. While results for oral communication skills were good, a weakness was observed in student writing skills and corroborated by faculty knowledge of student performance in courses.

To remedy this weakness, in Fall, 2012, the seminar courses in the sophomore year and beyond, ET 2001, 3001, and ET 4001, added significant writing components to their syllabi. In ET 2001, the course instructor added writing assignments covering ethics and global technology issues. ET 3001 now includes writing of resumes, cover letters, and a mock lab report in which student papers are returned for editing until satisfactory performance is attained. ET 4001 includes building of student portfolios in which students evaluate and reflect upon their performance in each of their academic years. Electronic portfolios were used for the first time in 2010-11. ET 4001 also includes reflective BLOGS in which the instructor poses significant questions requiring student commentary. Examples of the types of issues discussed include evaluation and discussion of the

relationship between the Engineering Technology curriculum and the required work experience, debate of such issues as global warming, outsourcing, and biorenewables, and the importance of professional societies. Student writing is graded, even on the BLOGS.

These changes were made in Fall, 2012. Instructors of lab courses have noticed improved grades in preliminary lab reports. It appears that this multi-tiered approach to improving writing skills in our Engineering Technology students has already reaped benefits. Formal assessment will be conducted at the end of the Fall, 2015 semester (after the ABET accreditation visit).