Computer Engineering Technology
2009-10 Assessment Report

I. Introduction

In 1965, OIT was invited to join a Technical Education consortium sponsored by a number of major computer manufacturers. In response, OIT developed an Electro-Mechanical Engineering Technology program. This program was based on a mix of existing EET, MET, Math and other support courses. The name of the program was changed to Computer Systems Engineering Technology in 1973 in order to better represent the course material and capabilities of graduates. Course offerings were expanded, refined and renumbered using CST prefixes to reflect their computer systems content. Since that time, the program has continued to evolve in order to track new developments in the field and keep graduates current. As of this time, the program is only offered on the Klamath Falls campus. Total enrollment in the program as of Fall 2007 was 109 students. As of fall 2008, there were 101 students in the program. By fall 2009 enrollment dropped to 89 students. However enrollment of new freshmen has been trending upwards in each of the past three years. At some point total enrollments will start to grow given larger freshmen classes and as the number of graduating seniors drops -- 17 students graduated in 2008-09 and 15 graduated in 2009-10. The 2008 graduate survey shows an average graduate salary of $60,600.

II. Summary of program mission, educational objectives and student learning outcomes

As a result of an ABET accreditation visit conducted in Fall of 2008, we revised our Program Educational Objectives. The reviewers felt that the Program Educational Objectives for both the Baccalaureate and the Associate degree programs sounded more like outcomes (in that they described skills needed at graduation) rather than program educational objectives (describing career and professional accomplishments). The revised PEOs were approved by our IAB, and they appear below. Also of note is that we adjusted one of our outcomes wording slightly as a result of reviewing it on preparation for this year's assessments. BS program outcome #7 used to read: "mastery of the techniques skills, and computer topics appropriate to the degree program, with depth in at least two sub disciplines (microprocessors, ASICs, software, computer architecture) of the computer engineering technology program". The phrase "computer topics" was replaced with "knowledge" to more accurately align it with ABET outcomes.

Mission

The mission of the Computer Engineering Technology (CET) Degree program in the Computer Systems Engineering Technology (CSET) Department at Oregon Institute of Technology is to provide an excellent education incorporating industry-relevant, applied laboratory based design and analysis to our students. The program is to serve a constituency consisting of its Alumni, employers in the high-technology industry, and the members of our IAB. Major components of the CET program's mission in the CSET Department are to:

I. educate computer engineering technology students to meet current and future industrial challenges,

II. promote a sense of scholarship, leadership, and professional service among our graduates,

III. enable our students to create, develop, and disseminate knowledge for the applied engineering environment,

IV. expose our students to cross-disciplinary educational programs, and provide high tech industry employers with graduates in the computer engineering technology profession, a profession which is increasingly being driven by advances in technology.

CET Program Educational Objectives

Program Educational Objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve.

Alumni of the Computer Engineering Technology (CET) Bachelor Degree program may be employed in a wide range of high tech industries from industrial manufacturing to consumer electronics where they will be involved in solving problems through the development of hardware, software and embedded applications. Alumni may be involved in product design, testing and qualification, application engineering, customer support, sales, or public relations.

A) Alumni will demonstrate technical competency through success in computer engineering technology positions and/or pursuit of engineering or engineering technology graduate studies if desired.

B) Alumni will demonstrate competencies in communication and teamwork skills by assuming increasing levels of responsibility and/or leadership or managerial roles.

C) Alumni will develop professionally, pursue continued learning and practice responsibly and ethically.

Alumni of the Computer Engineering Technology (CET) Associate Degree program may be employed as technicians or in support roles in a wide range of high tech industries from industrial manufacturing to consumer electronics. Alumni may be involved in product testing and qualification, customer support, sales, or public relations.

A) Alumni will demonstrate technical competence through success in computer engineering technician positions.

B) Alumni will demonstrate competencies in communication and teamwork skills through positive contributions to team based engineering projects.

C) Alumni will develop professionally, pursue continued learning and practice responsibly and ethically.

According to current statistics, one third of students who obtain the CET Associate degree also obtain a Bachelor degree in a related discipline, most often a Bachelor degree

in Software. In this case, the Associate degree adds breadth to their education. Alumni in this category would be expected to perform at a level consistent with the Bachelor degree program educational objectives.

CET Bachelor of Science Program Student Learning Outcomes

Graduates of the CET Bachelor's degree program are expected to be able to demonstrate:

(1) an ability to identify, formulate, and solve computer engineering technology problems, including the specification, design, implementation, and operation of systems and components, that meet performance, and quality requirements in a timely manner (Objective A & C) ;

(2) an ability to design, conduct, and interpret experiments including applying the results to verify the system (Objective A);

(3) an ability to function effectively on teams (Objective B);

(4) an understanding of professional, ethical and social responsibility (Objective C);

(5) a recognition of the need for, and an ability to engage in, life-long learning (Objective C).

(6) the ability to apply mathematics including differential and integral calculus, probability, and discrete mathematics to hardware and software problems (Objective A);

(7) mastery of the techniques, skills, and knowledge appropriate to the degree program, with depth in at least two sub disciplines (microprocessors, ASICs, software, computer architecture) of the computer engineering technology program (Objective A);

(8) an ability to use applied engineering tools, techniques, and skills including computer-based tools for design, analysis and simulation (Objective A);

(9) an ability to design, fabricate and test systems containing hardware and software components; as well as to analyze and interpret test results in order to improve the system (Objective A);

(10) an ability to convey technical material through oral presentation and interaction with an audience (Objective B);

(11) an ability to convey technical material through written reports which satisfy accepted standards for writing style (Objective B);

(12) an ability to improve system design with regard to quality and project management (Objective A).

CET Associate Degree Student Learning Outcomes

Graduates of the CET Associate degree program are expected to be able to demonstrate:

(1) an ability to identify, formulate, and solve computer engineering technology problems, including the test, implementation, and operation of systems and components, that meet performance and quality requirements in a timely manner (Objective A & C) ;

(2) an ability to design, conduct, and interpret experiments including applying the results to verify a system (Objective A);

(3) an ability to function effectively on teams (Objective B);

(4) an understanding of professional, ethical and social responsibility (Objective C);

(5) a recognition of the need for, and an ability to engage in, life-long learning (Objective C).

(6) the ability to apply mathematics including differential and integral calculus and discrete mathematics to hardware and software problems (Objective A);

(7) an ability to use applied engineering tools, techniques, and skills including computer-based tools for analysis, simulation, and testing (Objective A);

(8) an ability to fabricate and test engineering systems containing hardware and software components (Objective A);

(9) an ability to convey technical material through oral presentation and interaction with an audience (Objective B);

(10) an ability to convey technical material through written reports which satisfy accepted standards for writing style (Objective B);

III. Assessment Cycle

The current assessment cycle appears below. For the BS program, four of the 12 student learning outcomes are assessed each year of a three year cycle. For the AE program, the outcomes that correspond to the BS program outcomes are assessed.

CET BS Program Assessment Plan – 2009-10

Learning Outcome	2009-10	2010-11	2011-12
(1) an ability to identify, formulate, and solve computer engineering technology problems, including the specification, design, implementation, and operation of systems and components, that meet performance, and quality requirements in a timely manner;		•	
(2) an ability to design, conduct, and interpret experiments including applying the results to verify the system;			•
(3) an ability to function effectively on teams;	•		
(4) an understanding of professional, ethical and social responsibility;	•		
(5) a recognition of the need for, and an ability to engage in, life-long learning.		•	
(6) the ability to apply mathematics including differential and integral calculus, probability, and discrete mathematics to hardware and software problems;			•
(7) mastery of the techniques skills, and knowledge appropriate to the degree program, with depth in at least two sub disciplines (microprocessors, ASICs, software, computer architecture) of the computer engineering technology program;	•		
(8) an ability to use applied engineering tools, techniques, and skills including computer-based tools for design, analysis and simulation;			•
(9) an ability to design, fabricate and test systems containing hardware and software components; as well as to analyze and interpret test results in order to improve the system;			•
(10) an ability to convey technical material through oral presentation and interaction with an audience;		•	
(11) an ability to convey technical material through written reports which satisfy accepted standards for writing style;		•	
(12) an ability to improve system design with regard to quality and project management	•		

CET AS Program Assessment Plan – 2009-10

Learning Outcome	2009-10	2010-11	2011-12
(1) an ability to identify, formulate, and solve computer engineering technology problems, including the test, implementation, and operation of systems and components, that meet performance and quality requirements in a timely manner;		•	
(2) an ability to design, conduct, and interpret experiments including applying the results to verify a system;			•
(3) an ability to function effectively on teams;	•		
(4) an understanding of professional, ethical and social responsibility;	•		
(5) a recognition of the need for, and an ability to engage in, life-long learning;		•	
(6) the ability to apply mathematics including differential and integral calculus and discrete mathematics to hardware and software problems;			•
(7) an ability to use applied engineering tools, techniques, and skills including computer-based tools for analysis, simulation, and testing;			•
(8) an ability to fabricate and test engineering systems containing hardware and software components;			•
(9) an ability to convey technical material through oral presentation and interaction with an audience;		•	
(10) an ability to convey technical material through written reports which satisfy accepted standards for writing style		•	

IV. Summary of 2009-10 Assessment Results

During the 2009-10 academic year, the program faculty assessed four student learning outcomes as summarized below. These outcomes are mapped to the CET curriculum in Appendix A. Additional information can be found in department assessment records.

Student Learning Outcome #3 (B.S. and A.E. degrees): an ability to function effectively on teams.

Direct Assessment #1
Data Collection Date: 11/23/09
Coordinator: Ralph Carestia

Assessment Method: Freshmen teams in CST 102 were observed while performing the table follower lab assignment. They were scored using the Teamwork Rubric.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
Helping	Number of teams ranked Exemplary or Accomplished	50%	100% (4/4)
Listening	"	50%	100% (4/4)
Participating	"	50%	100% (4/4)
Persuading	"	50%	75% (3/4)
Questioning	"	50%	75% (3/4)
Respecting		50%	100% (4/4)
Sharing	"	50%	75% (3/4)

Evaluation 12/9/09: Students exceeded expectations. This compares favorably with the same evaluation given to Freshmen in Fall 07. It reflects partly on the quality of the freshman class as well as on the inclusion of a discussion on teamwork in the CST 102 class.

Actions 12/9/09: No actions are needed at this time.

Direct Assessment #2
Data Collection Date: 03/01/10
Coordinator: Phong Nguyen

Assessment Method: Junior teams in CST 372 were observed by the professor over the course of Fall and Winter terms. They were scored using the OIT Team and Group Work rubric.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
Identify and achieve goal/purpose	Number of teams ranked Proficient or Highly Proficient	70%	33.3% (1/3)
Assume roles and responsibilities as appropriate	“	70%	100% (3/3)
Team/group members interact appropriately	“	70%	100% (3/3)
Recognize and help reconcile differences among team/group members	“	70%	100% (3/3)
Team/group members share work appropriately	“	70%	100% (3/3)
Develop strategies for effective action		70%	33.3% (1/3)

Evaluation 05/12/10: The reason that 2 of the performance criteria were not met is that 2 out of 3 teams received incompletes for failing to complete the project by the deadline, and so were judged not to have met the team goal (which would be a completed project) or to have developed a strategy for effective action (which would have been evidenced by a completed project). Junior project teams often seem to have trouble in following through with their plans in a timely manner.

Actions 05/12/10: It is difficult for students to understand the need for timely action since they have not had this experience before, so they have little idea as to how much extra effort and timeliness is needed in order to respond to a problem. In our discussion of these results we observed that, for the most part, the teamwork in each of these teams was really quite good (as evidenced by the other criteria and by professor observation). The only real problem is one of timeliness which is attributable to inexperience more than a failure to work cooperatively in a team. The performance criteria, OIT wide performance criteria, may have been designed with less ambitious projects in mind where project completion in one or two terms can always be attained. In other words, these two performance criteria may not appropriately reflect teamwork effectiveness for our Junior project sequence. However, project completion is important and to further this, we will continue to emphasize the need for timely response when problems occur and we will also implement a set of benchmarks to be checked off at the end of each term.

Indirect Assessment #1
Data Collection Date: 03/01/10
Coordinator: Phong Nguyen

Assessment Method: Each student in CST 372 was asked to score their own team members using the OIT Team and Group Work rubric based on their experience over the course of Fall and Winter terms.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
Identify and achieve goal/purpose	Number of students ranking their team as Proficient or Highly Proficient	70%	80% (8/10)
Assume roles and responsibilities as appropriate	"	70%	80% (8/10)
Team/group members interact appropriately	"	70%	100% (10/10)
Recognize and help reconcile differences among team/group members	"	70%	100% (10/10)
Team/group members share work appropriately	"	70%	80% (8/10)
Develop strategies for effective action		70%	80% (8/10)

Evaluation 06/02/10: This data reflect the students self evaluation that they were on track with their projects.
Actions 06/02/10: As an indirect assessment, no actions need to be taken.

Student Learning Outcome #4 (B.S. and A.E. degrees): an understanding of professional, ethical and social responsibility.

Direct Assessment #1
Data Collection Date: 12/07/09
Coordinator: Ralph Carestia

Assessment Method: Freshmen in CST 102 were given an assignment to locate a scenario involving ethics in engineering and to write a paper which would evaluate the scenario based on the IEEE code of ethics. The student papers were graded by department faculty using the OIT

Ethics rubric and the following scale: Limited or No proficiency, Some Proficiency, Proficiency and High Proficiency.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
Using a code of ethics, describes the issues	Number at proficiency or high proficiency	70%	100% (12/12)
Describes the parties involved and discusses their points of view	Number at proficiency or high proficiency	70%	75% (9/12)
Describes and analyzes possible / alternative approaches	Number at proficiency or high proficiency	70%	58.3% (7/12)
Chooses an approach and explains the benefits and risks	Number at proficiency or high proficiency	70%	50% (6/12)

Evaluation 12/9/09: Students were able to meet or exceeded expectations in the first two categories, but failed in the other two. Class work covered the first two performance criteria, but a scenario analysis was not performed in class, so it was not surprising the students did poorly in this area.

Actions 12/9/09: The plan is to find a way to dedicate a couple of lectures to scenario analysis.

Direct Assessment #2
Data Collection Date: 12/04/09
Coordinator: Ralph Carestia

Assessment Method: Seniors in CST 441 were asked to discuss 3 provisions of a code of ethics. Students were also given a scenario containing an ethical problem and asked to evaluate the ethical issues, parties involved, analyze possible approaches, and choose and discuss an approach. The student papers were graded by department faculty using the OIT Ethics rubric and the following scale: Limited or No proficiency, Some Proficiency, Proficiency and High Proficiency.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
Demonstrate an understanding of provisions of a code of ethics	Number at proficiency or high proficiency	70%	88.2% (45/51)
Using a code of ethics, describes the issues	Number at proficiency or high proficiency	70%	70.6% (12/17)
Describes the parties involved and discusses their points of view	Number at proficiency or high proficiency	70%	76.5% (13/17)
Describes and analyzes possible / alternative approaches	Number at proficiency or high proficiency	70%	64.7% (11/17)
Chooses an approach and explains the benefits and risks	Number at proficiency or high proficiency	70%	70.6% (12/17)

Evaluation 12/9/09: Students met or exceeded expectations in all but one category. They were weak in describing and analyzing possible alternative approaches. It was felt that this stemmed from not having had any instruction, or prior experience with an assignment of this type. Five of the seniors in this assessment had instruction in ethics in PHIL 331 (Ethics in the Professions). These students exceeded expectations in all criteria.

Actions 12/9/09: At this point we decided not to make PHIL 331 a required class in the program. We are currently considering revamping the material in the Business 304 class. One option could be to include a week or two on ethics. We are also planning on adding more instruction on ethics in CST 102/4. (See the freshman ethics assessment evaluation). How the current and planned instruction in CST 102/4 on ethics will impact seniors will be assessed in the next cycle. This year's seniors did not have any instruction in ethics in their CST 102/4 classes.

Direct Assessment #3
Data Collection Date: 02/22/10 – 03/09/10
Coordinator: Ralph Carestia

Assessment Method: Seniors in CST 451 were observed while presenting their senior design review. A rubric was used to score their acceptance of other's opinions, their respect for other students, how well they shared information and collaborated with others in resolving differences, their ability to handle conflict, and how well conflict was resolved.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
Acceptance of other's opinions	Number at excellent or good.	70%	76.5% (13/17)
Respect for others	"	70%	76.5% (13/17)
Collaboration and information sharing	"	50%	64.7% (11/17)
Ability to handle conflict	"	70%	100% (17/17)
Resolution of conflict	"	70%	76.5% (13/17)

Evaluation 03/09/10: Students met or exceeded expectations in all but one category. They exhibited a strong sense of professionalism. Many students exceeded the professor's expectations in their understanding of professionalism and in their respect for the opinions of others. Collaboration results and the standard set are lower because students in Senior project were working on somewhat dissimilar projects, so student's didn't have detailed information to share with each other.

Actions 6/02/09: No actions need to be taken as a result of this assessment.

Direct Assessment #4
Data Collection Date: 04/22/10
Coordinator: Doug Lynn

Assessment Method: Graduation Seniors in CST were assessed by all faculty in the CST program with respect to a number of performance criteria in professionalism using an OIT rubric, and the results were averaged. A 3 point scale was used – exceeds, meets or does not meet faculty expectations.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
Timeliness of work: Student performs tasks in a timely manner.	Number at meets or exceeds faculty expectations.	70%	81.8% (9/11)
Quality of work a: Student performs assigned tasks according to course expectations.	“	70%	90.9% (10/11)
Quality of work b: Student work product is done in a professional manner.	“	70%	100% (11/11)
Attitude toward feedback: Student accepts feedback appropriately.	“	70%	100% (11/11)
Attitude toward assigned tasks: Student accepts & carries out tasks with positive attitude.	“	70%	100% (11/11)
Punctuality: Student arrives on time or gives appropriate notification.	“	70%	81.8% (9/11)
Attendance: Student regularly attends classes/meetings or gives appropriate notification.	“	70%	81.8% (9/11)
Academic integrity: Student follows OIT Student Conduct Code.	“	70%	100% (11/11)
Interpersonal skills: Student interacts appropriately with others.	“	70%	100% (11/11)
Knowledge of classroom policies & procedures: Student is aware of and follows classroom policies and procedures	“	70%	100% (11/11)
Work ethic: Student demonstrates effort and hard work.	“	70%	100% (11/11)
Appearance: When required, student demonstrates appropriate professional appearance.	“	70%	100% (11/11)

Evaluation 5/12/09: Students met or exceeded expectations in all categories.

Actions 5/12/09: No actions need to be taken as a result of this assessment.

Direct Assessment #5
Data Collection Date: Final week Spring 2009
Coordinator: Ralph Carestia

Assessment Method: Seniors in ANTH 452 Globalization were assigned to write a final paper on the topic of how engineers perpetuate globalization and the impact of Computer engineering on the world's economic development. These papers were collected and later scored by CET faculty using a rubric near the end of spring term 2010.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
Identification of global factors	Number at excellent or good. (4 point scale)	70%	100% (10/10)
Analysis of impact of relevant global factors	"	70%	100% (10/10)
Application of Analysis	"	70%	90% (9/10)
Recommendations and Conclusions	"	70%	20% (2/10)

Evaluation 6/09/10: Students were able to identify the relevant global factors, how companies might take advantage of globalization to increase efficiency and flexibility and they were able to analyze and develop strategies. However they were unable to adequately draw conclusions or make recommendations.

Actions 6/09/10: It may be that the assignment did not lend itself well to eliciting recommendations from the students. It is likely that they viewed the assignment as one primarily focused on analysis. We will ask the professor for the class to address this next time the class is taught.

Student Learning Outcome #7 (B.S. degree): mastery of the techniques skills, and knowledge appropriate to the degree program, with depth in at least two sub disciplines (microprocessors, ASICs, software, computer architecture) of the computer engineering technology program.

Direct Assessment #1
Data Collection Date: 11/23/09
Coordinator: Ralph Carestia

Assessment Method: Seniors CST 441 were given a closed book True/False VHDL exam to determine their level of mastery of the VHDL language and code related issues. The exam was consistent with the level of an industry certification exam in VHDL.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
Score on VHDL exam	Exam Score at Proficiency (65% or above)	70%	72% (13/18)

Evaluation 12/9/09: Students met expectations.

Actions 12/9/09: Since the students just met expectations, the faculty plan to use more closed book quizzes in preparation for this exam. This will hopefully require students to study more and be better prepared.

Direct Assessment #2
Data Collection Date: Fall 09
Coordinator: Doug Lynn

Assessment Method: Seniors in CST 344 (Intermediate Architecture) were evaluated on their knowledge of computer architecture through a selected set of exam questions from the midterm and final exams in this class.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
Ability to compute CPI given percentage of instruction usage	Correct result	70%	73.3% (11/15)
Ability to compute performance increase using Amdahl's law	Correct result	70%	73.3% (11/15)
Ability to represent a number using a signed-digit notation	Correct result	70%	80% (12/15)
Ability to convert a decimal number to IEEE 754 floating point format	Correct result	70%	86.7% (13/15)
Ability to define the terms: vertical microcode and horizontal microcode	Correct definition	70%	86.7% (13/15)

Evaluation 12/9/09: Students met and exceeded expectations.

Actions 12/9/09: No actions need to be taken as a result of this assessment.

Direct Assessment #3
Data Collection Date: Winter 10
Coordinator: Doug Lynn

Assessment Method: Seniors in CST 442 (Advanced Architecture) were evaluated on their knowledge of computer architecture through a selected set of exam questions from the midterm and final exams in this class.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
Ability to count the number of cycles including stalls that a section of code requires	Correct result	70%	75% (12/16)
Ability to rearrange code to avoid stalls	Correct result	70%	81.3% (13/16)
Demonstrate understanding of the term: “antidependence”	Correct result	70%	81.3% (13/16)
Demonstrate understanding of strong and weak scaling	Correct result	70%	68.8% (11/16)
Ability to define the terms: “unmapped memory”	Correct definition	70%	68.8% (11/16)
Ability to define the terms: “arithmetic intensity”	Correct definition	70%	93.8% (15/16)
Demonstrate understanding of the role of a TLB	Correct result	70%	87.5% (14/16)
Demonstrate understanding of cache coherency	Correct result	70%	93.8% (15/16)
Demonstrate understanding of the purpose of two-level and inverted page tables	Correct result	70%	81.3% (13/16)

Evaluation 03/22/10: For the most part, students met and exceeded expectations. They were weak in the areas of strong and weak scaling, and unmapped memory. In retrospect, these areas were treated lightly in class based on the assumption that students would easily master these concepts.

Actions 05/12/10: A bit more emphasis will be placed on these areas next time the class is taught; otherwise the results show no need for major adjustments.

Direct Assessment #4
Data Collection Date: June 4, 2010
Coordinator: Todd Breedlove

Assessment Method: Freshmen in CST 126 were evaluated according to a rubric based on one lab assignment in order to assess software knowledge and skills.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
Implementation (proper use of programming constructs and techniques)	Number at proficiency or high proficiency	70%	96.9% (31/32)
Functionality/Quality (program has correct output and no memory leaks)	“	70%	90.6% (29/32)
Specifications (program meets specifications)	“	70%	100% (32/32)
Performance (program uses efficient coding techniques)	“	70%	90.6% (29/32)

Evaluation 06/09/10: The assessment was actually directed more at design and implementation than an assessment of knowledge and skill. This can be credited to poor communication of the desired assessment on the part of the program director. However, the results under implementation, functionality, specifications and performance reflect well on student knowledge and skill.

Actions 06/09/10: These data show no need for changes with respect to student knowledge and skills in software. Next time the assessment is run, the program director will be more explicit with respect to the desired assessment.

Direct Assessment #5
Data Collection Date: June 4, 2010
Coordinator: Doug Lynn

Assessment Method: Juniors in CST 331 were observed setting up and using a Logic analyzer to observe output from a PWM generator.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
Ability to set up the analyzer correctly	Number correct	70%	100% (3/3)
Ability to setup a moderately complex trigger	Number correct	70%	100% (3/3)
Ability to measure time periods and interpret analyzer output	Number correct	70%	100% (3/3)

Evaluation 06/09/10: All students exceeded expectations. The class is small this year, and all the students have easily mastered using the analyzer.

Actions 06/09/10: There are no changes that need to be made as a result of this assessment.

Student Learning Outcome #12 (B.S. degree): an ability to improve system design with regard to quality and project management.

Direct Assessment #1
Data Collection Date: Winter 09
Coordinator: Ralph Carestia

Assessment Method: Seniors in senior project classes were evaluated with regards to quality by program faculty using a common rubric. The individual faculty results were then averaged.

Performance Criteria	Measurement Scale	Minimum Acceptable Performance	Results
Learning stretch evident	Number at Exceptional or Strong	70%	85.7% (6/7)
Quality of project	"	70%	100% (7/7)
Project presentation	"	70%	100% (7/7)
Creative approach	"	70%	100% (7/7)

Evaluation 06/02/10: Students met and exceeded expectations in all performance criteria. However, not all student senior projects were ready for presentation.

Actions 06/02/10: Not actions need to be taken as a result of this assessment.

This was the only assessment completed for outcome #12 this year. In retrospect, we decided we should also evaluate this outcome based on an assessment of improvements made between the first and second design reviews in order to observe improvements as a result of the project management process. We plan to do this next year in Junior and Senior Project.

V. Summary of Student Learning

Student Learning Outcome #3 (B.S. and A.E. degrees): an ability to function effectively on teams.
Two direct and one indirect assessment were completed for this outcome. Freshmen students exceeded expectations in all criteria. Juniors (in junior project) exceeded expectations in all criteria on an OIT wide assessment except two related to project completion. We reflected that the requirement for completion of the project in two terms may not appropriately reflect teamwork effectiveness in the context of more complex projects. However, project completion is important and to further this, we will continue to emphasize the need for timely response when problems occur and we will also implement a set of benchmarks to be checked off at the end of each term in Junior Project. Otherwise we were quite pleased with the level of performance of our students.

Student Learning Outcome #4 (B.S. and A.E. degrees): an understanding of professional, ethical and social responsibility.
Two direct assessments each were conducted in the areas of ethics and professionalism and one was conducted on social responsibility. Students met or exceeded expectations in all criteria in professionalism, but failed to meet expectations in all criteria in ethics and social responsibility. The few criteria they failed at were in the area of presenting and analyzing alternative solutions to an ethical problem or make recommendations mitigating adverse social impacts. The recommended solution here relates to adding some more instruction related to ethical scenarios in CST 102 or 104 and drawing conclusions and making recommendations in ANTH 452.

Student Learning Outcome #7 (B.S. degree): mastery of the techniques skills, and knowledge appropriate to the degree program, with depth in at least two sub disciplines (microprocessors, ASICs, software, computer architecture) of the computer engineering technology program.
Five direct assessments were conducted for this outcome covering skills and knowledge. Students generally met and exceeded expectations in all criteria, but some were only weakly met. Improved instruction and increased emphasis is planned in various classes to address these issues.

Student Learning Outcome #12 (B.S. degree): an ability to improve system design with regard to quality and project management.
One direct assessment was conducted for this outcome in which students (seniors in senior project) met and exceeded all performance criteria. However, in discussing this assessment, we decided that a better way to assess it would be to assess improvements made between the first and second design reviews in both junior and senior project in order to observe improvements that *result from* the project management process. We plan to do this assessment next year in Junior and Senior Project.

VI. Changes Resulting from Assessment

That freshmen students exceeded expectations on the teamwork assessment compares favorably with the same evaluation given to Freshmen in Fall 07. It reflects partly on the quality of the freshman class as well as on the inclusion of a discussion on teamwork in the CST 102 class that was recommended as a result of the Fall 07 assessment.

Appendix A: SLO Curriculum Maps

Outcome Assessment Points, BS Program H = Highly assessable M = Weakly assessable blank = Low to not assessable		(1) problem solving	(2) experiment	(3) teamwork	(4) ethical / social resp	(5) life-long learning	(6) calc, prob, discrete	(7) master skills + knowledge	(8) design, analysis, sim	(9) design, fab, test, improve	(10) oral presentation	(11) written presentation	(12) quality, proj. manage
Freshman Year	Eval. Cycle ⇨	Y1	Y2	Y1	Y3	Y2	Y1	Y3	Y2	Y1	Y3	Y2	Y3
CST 102	Intro to Comp ET	M	M	M	M					M		M	
CST 162	Intro to Digital Logic	H	M				M						
MATH 111	College Algebra												
WRI 121	English Comp												
CST 116	C++ Prog I												
CST 130	Computer Org						M						
MATH 112	Trigonometry												
WRI 122	English Comp												
CST 126	C++ Prog II												
CST 131	Comp Arch						M						
MATH 251	Diff Calculus						M						
SPE 111	Fund of Speech										M		
SSC	SS Elective												
Sophomore Year													
CST 250	Assembly Lang												
MATH 252	Integral Calculus						M						
PSY 201	Psychology												
WRI 227	Tech Report											M	
CST 133	Dig Elec II – Seq w HDL						M			M			
CST 204	Intro to µcontrollers						M		M	M			
EE 221	DC & 1st Ord Trans												
CST 231/2	Comp Des w/PLD	M	H			M	M		M	H			
MATH 254N	Vector Calc						H						
CST 313	Comp Soft Tech	M	M				M	M	M	M			
EE 223	AC & 2nd Ord Trans												
SPE 321	Team Comm			M							H		
HUM	Hum Elective												
MATH	Math Elective						H						

Outcome Assessment Points, BS Program continued		(1) problem solving	(2) experiment	(3) teamwork	(4) ethical / social resp	(5) life-long learning	(6) calc, prob, discrete	(7) master skills + knowledge	(8) design, analysis, sim	(9) design, fab, test, improve	(10) oral presentation	(11) written presentation	(12) quality, proj. manage
Junior Year	Eval. Cycle ⇨	Y1	Y2	Y1	Y3	Y2	Y1	Y3	Y2	Y1	Y3	Y2	Y3
EE 321	Intro Amp & Semi												
CST 335	I/O Interfacing	M	M	M		M				M			
CST 371	Embedded Sys Dev I	H	M	H		M			H	M	H	H	M
PHY 221	Physics w/Calculus												
CST 321	Intro to proc	M	M				M	M	M	M		H	
CST 372	Embedded Sys Dev II	H	M	H		M	M	M	H	H	M	M	M
PHY 222	Physics w/Calculus												
WRI 327	Adv Tech Writing											H	
CST 331	Microproc Interface	M	M				M	M	M	M		M	
CST 351	Advanced PLDs	H	H		M	M		M	H	M			M
CST 373	Embedded Sys Dev III	H	H	H	M	H	M	M	M	H	H	H	H
PHY 223	Physics w/Calculus												
HUM	Hum Elective				M								
Senior Year													
BUS 304	Engr Management				M								
CST 344	Intermediate Arch	M			M		M	M	M	M			
CST 441	Logic Synth w VHDL	H	H		M	M		H	H	M			
CST 418	Data Comm & Net	M				M	H						
CST xxx	Tech Elective					M							
CST 442	Advanced Arch.	M				M	H	H	M	M			
CST 451	ASIC Des using FPGAs	H	H		M	M		H	M	H	H	H	M
SSC	SS Elective				M								
IMGT 345	Engr Economy				M								M
CST 464	RISC-Based µproc	M	M	M		M		M	M	M			
CST 461	Adv Topics in VLSI	M	H				M	H	H			M	
PSY 347	Org Behavior				M								
HUM	Hum Elective				M								

Outcome Assessment Points, AE Progam H = Highly assessable M = Weakly assessable blank = Low to not assessable		(1) problem solving	(2) experiment	(3) teamwork	(4) ethical / social resp	(5) life-long learning	(6) calc, discrete	(7), analysis, sim, test	(8) fabricate, test	(9) oral presentation	(10) written presentation
Freshman Year	Eval. Cycle ⇨	Y1	Y2	Y1	Y3	Y2	Y1	Y2	Y1	Y3	Y2
CST 102	Intro to Computer Eng. Tech.	M	M	M					M		M
CST 162	Intro to Digital Logic	H	M				M				
MATH 111	College Algebra										
WRI 121	English Composition										
CST 116	C++ Programming I										
CST 130	Computer Organization						M				
MATH 112	Trigonometry										
WRI 122	English Composition										
CST 126	C++ Programming II										
CST 131	Computer Architecture						M				
MATH 251	Differential Calculus						M				
SPE 111	Fundamentals of Speech									M	M
SSC	Social Science Elective										
Sophomore Year											
CST 250	Computer Assembly Language										
MATH 252	Integral Calculus						M				
PSY 201	Psychology										
WRI 227	Technical Report Writing										M
CST 133	Dig. Elec. II – Seq. Logic w HDL						M				
CST 204	Introduction to µcontrollers						M				
EE 221	Circ. I – DC & 1st Order Trans.										
CST 231	Computer Design w/PLD	M	H			M	M	M	H		
CST 232	Comp. Design w/PLD Lab	H	H			M	M	M	H		
PHY 221	General Physics w/Calculus										
CST 313	Comp Software Techniques	H	M	H			M	M	M		M
EE 223	Circ. II – AC & 2nd Order Trans.										
PHY 222	General Physics w/Calculus										
HUM	Humanities Elective				M						
CST xxx	Technical Elective**					M					