

Oregon Institute of Technology
Computer Systems Engineering Technology Department
Embedded Systems Engineering Technology Program Assessment
2007-08

I. Introduction

The Embedded Systems Engineering Technology (ESET) program was proposed to OUS in spring of 2006 and approved in August, 2006. The curriculum for the ESET program is common with the hardware and software programs for the freshman year. The sophomore year of the ESET program has been constructed to mirror the track through both the Computer Engineering Technology (CET) and Software Engineering Technology (CET) programs, called the Dual Degree program. The ESET program junior year is when ESET students get instruction specific to topics of embedded systems engineering. These courses will be taught for the first time in fall, 2008.

II. Mission, Objectives and Student Learning Outcomes

The mission of the Embedded Systems Engineering Technology (ESET) Degree program within the Computer Systems Engineering Technology (CSET) Department at Oregon Institute of Technology is to prepare our students for productive careers in industry and government by providing an excellent education incorporating industry-relevant, applied laboratory based instruction in both the theory and application of embedded systems engineering. Our focus is educating students to meet the growing workforce demand in Oregon and elsewhere for graduates prepared in both hardware and software aspects of embedded systems. Major components of the ESET program's mission in the CSET Department are:

- I. To educate a new generation of Embedded Systems Engineering Technology students to meet current and future industrial challenges and emerging embedded systems engineering trends.
- II. To promote a sense of scholarship, leadership, and professional service among our graduates.
- III. To enable our students to create, develop, apply, and disseminate knowledge within the embedded systems development environment.
- IV. To expose our students to cross-disciplinary educational programs.
- V. To provide government and high tech industry employers with graduates in embedded systems engineering and related professions.

Program Educational Objectives

- A. Graduates of the embedded program are expected to understand societal impact of embedded systems and technological solutions.
- B. Graduates of embedded degree program are expected to do hardware/software co-design for embedded systems. Graduates will continue to develop skills in analysis, approach, optimization, and implementation of embedded systems.
- C. Graduates of the embedded program are expected to obtain the knowledge, skills and capabilities necessary for immediate employment in embedded systems. Embedded Systems is a profession increasingly driven by advances in technology, therefore graduates are expected to obtain the necessary life-long learning skills to enable them to be able to adapt to a changing environment.
- D. Graduates of the embedded program are expected to develop a broad base of skills. These skills will prepare them for professional practice: 1) as embedded engineers, 2) participants in embedded development teams, and 3) effective communicators within a multidisciplinary team.
- E. Graduates of the embedded program are expected to acquire knowledge of management and marketing of embedded projects and products and to prepare for series production.

Student Educational Outcomes

Embedded Systems Engineering Technology baccalaureate graduates will have demonstrated:

- 1 . A knowledge of applied differential and integral calculus and discrete mathematics. (Objective C, D)
2. A knowledge of probability and statistics and the impact of these in analysis of embedded systems. (Objective C, D, E)
3. A knowledge of embedded systems engineering technology, along with some specialization in at least one area of computer systems engineering technology. (Objective D)
4. A broad education and knowledge of contemporary issues necessary to reason about the impact of embedded system based solutions to situations arising in society. (Objective A)
5. The ability to identify and synthesize solutions for embedded system problems by making use of their knowledge and experience with basic mathematics and science. (Objective B, C)
6. The ability to design, conduct and evaluate the results of experiments on

embedded platforms. (Objective C, D)

7. The ability to analyze, design and test systems that include both hardware and software. (Objective B, D)

8. The ability to document experimental processes and to write satisfactory technical reports/papers. (Objective D, E)

9. The ability to make technical oral presentations and interact with an audience. (Objective D, E)

10. The recognition for and the motivation to further develop their knowledge and skills as embedded engineering advances occur in industry. (Objective C)

11. The ability to work effectively independently and in multi-person teams. (Objective D)

12. An understanding of professional and ethical responsibility. (Objective A, D)

III. Three-Year Cycle for Assessment of Student Learning Outcomes

On October 5, 2007 the Embedded Systems Engineering Technology Faculty met to discuss which outcomes for the baccalaureate degree would be assessed during the 2007 – 2008 academic year. Since the ESET program is in a state of flux with a low student population, the faculty decided to begin the assessment cycle in fall, 2008. Table 1 presents the results of these discussions.

Table 1: Baccalaureate Outcome Assessment Timeline

#	Learning Outcomes	08-09	09-10	10-11	11-12	12-13	13-14
1	A knowledge of applied differential and integral calculus and discrete mathematics.	X			X		
2	A knowledge of probability and statistics and the impact of these in analysis of embedded systems.	X			X		
3	A knowledge of embedded systems engineering technology, along with some specialization in at least one area of computer systems engineering technology.	X			X		
4	A broad education and knowledge of contemporary issues necessary to reason about the impact of embedded system based solutions to situations arising in society.			X			X
5	The ability to identify and synthesize solutions for embedded system problems by making use of their			X			X

	knowledge and experience with basic mathematics and science.						
6	The ability to design, conduct and evaluate the results of experiments on embedded platforms.			X			X
7	The ability to analyze, design and test systems that include both hardware and software.			X			X
8	The ability to document experimental processes and to write satisfactory technical reports/papers.	X			X		
9	The ability to make technical oral presentations and interact with an audience.		X			X	
10	The recognition for and the motivation to further develop their knowledge and skills as embedded engineering advances occur in industry.			X			X
11	The ability to work effectively independently and in multi-person teams.			X			X
12	An understanding of professional and ethical responsibility.			X			X

To summarize, Table 2 shows the outcomes (identified by number only) that will be assessed for each of the next three years.

Table 2: Summary of Assessment Timeline

Academic Year	Outcomes
2008-09	1, 2, 3, 8
2009-10	9, 10, 11, 12
2010-11	4, 5, 6, 7

IV. Summary of ESET Assessment Activities

The ESET program courses do not become specific to the degree offering until Fall of the Junior Year. The catalog advertised the first entry into the ESET program starting Fall 2006. The first year of the Software Engineering Technology, Computer Hardware Engineering Technology, and the Embedded Systems Engineering Technology programs are common. The second year of the Dual Degree course mapping and the ESET program are also common. The Junior Project course is the first area of the curriculum where the ESET students are officially separated from the other two programs, giving an ideal time to perform assessment of student skills for students entering the courses specific to the ESET program. This course is CST 371 – Embedded Systems Development I. The first set of students will be in this course Fall of 2008. Planning is currently underway for the 2008-2009 year in the ESET program related to the assessment of learning outcomes 1, 2, 3, and 8.