

DEPARTMENT REPORT OF PROGRAM LEARNING OUTCOMES ASSESSMENT

Department: Electronics Engineering Technology

Program (Degree): Electronics Engineering Technology (EET)

Type of Degree: X AAS AA AS ATS AIS

Chairperson: Jeff Donbar (Interim) Date: 2/28/08

Person(s) Interviewed: Jeff Donbar

- I. Program Curriculum:** A description of the basis for the program curriculum (i.e., how it is derived and validated). Include accreditation organizations, advisory committees or external groups that influence curriculum. Describe curriculum review activities including the review of course master syllabi.*

The Technology Accreditation Commission (TAC) of the Accreditation Board for Engineering and Technologies (ABET) is the national accreditation agency. Minimum standards are set by TAC for EET programs. The last accreditation visit was in 2004 and the EET Department received accreditation for six years (due to a national backlog, selected programs in the nation were given an extra year of accreditation). Next accreditation visit is scheduled to take place in the fall of 2010.

The basis for the EET curriculum review included: ABET standards, advisory committee input, employee feedback, changes in the professional knowledge base, peer networking, professional conferences, student feedback from formative assessment data, and availability of specific simulation software such as MultiSim and UltiBoard. Also, the advisory committee has indicated the use of LabVIEW data acquisition software has increased and should become widely used in the curriculum. Faculty have reviewed the program and has chosen to adopt more of a systems approach to electronics as opposed to a component approach. This new focus will emphasize the ability to work between schematic diagrams, bread boarding and PC boards. Minor course changes were required for this change and the new curriculum will become effective in fall 2008.

The Engineering Technologies division now has a dual admissions agreement with the University of Dayton and Miami University, Hamilton campus, and EET is one of the participating programs for these two institutions. EET also has articulation agreements with five other universities. The department continues its two plus two articulation agreement with The University of Toledo's online bachelor's degree program.

Local Advisory Committee input continues to influence program improvements and changes.

Master syllabi are in the process of revision due to the change to a systems approach.

The department elected to add a Computer Engineering Technology (CET) option within the EET program. The CET program will retain the core EET curriculum, but will provide courses in computer repair and troubleshooting, alternative operating systems, and PC based engineering systems. There has been significant interest in such a program by students and local employers.

- II. **Program Learning Outcomes:** A description of what you intend for students to know (cognitive), think/feel (affective), or do (psychomotor), when they have completed your degree program. A suggested manageable number of outcomes should be in the range of five to ten. Describe Program Learning Outcomes review activities.*

The program learning outcomes were reviewed in 2004, and the following revised outcome were adopted:

Program Outcomes Electronics Engineering Technology

EET-A: Design & Assembly	(Meets TAC/ABET outcomes a & d)
EET-B: Circuit Analysis	(Meets TAC/ABET outcomes a, b & f)
EET-C: Computer Skills	(Meets TAC/ABET outcomes a & h)
EET-D: Test & Troubleshoot	(Meets TAC/ABET outcomes a & c)
EET-E: Teamwork	(Meets TAC/ABET outcome e)
EET-F: Communication	(Meets TAC/ABET outcome g)
EET-G: Citizenship	(Meets TAC/ABET outcome j)
EET-H: Lifelong Learning	(Meets TAC/ABET outcome h)
EET-I: Professionalism	(Meets TAC/ABET outcomes i & k)

Outcome EET-A

Title: Design & Assembly

Statement: An ability to design, assemble, fabricate, modify, and interface electronic circuits for real world applications.

Definition: This outcome is devoted to the tools and techniques for building circuits. It does not include circuit analysis or microprocessor programming. Students demonstrate this outcome when they create working electronic circuits. This outcome includes: mechanical skills such as soldering, desoldering, wire wrapping, and using breadboards or a Protoboard, knowledge of codes used on electrical components to specify values and tolerances, and the ability to layout components for a circuit in an efficient way.

Outcome EET-B

Title: Circuit Analysis

Statement: An ability to analyze electrical and electronic circuits

Definition: This outcome covers the application of mathematics, science (especially physics), engineering, and computer programming to understand and affect the behavior of electrical and electronic circuits. Students demonstrate this outcome when they solve textbook-style problems involving AC & DC circuits, instrumentation, analog and digital electronics, microprocessors, lasers, fiber optics, and communications system.

Outcome EET-C

Title: Computer Skills

Statement: An ability to use computers effectively.

Definition: EET students must be proficient in the use of business applications including word processing, spreadsheets, slide presentations, and databases, and applications that are specific to the profession such as Electronics Workbench, OrCAD, B2 LOGIC, and Altera. EET students must know how to use the Internet to find technical information on circuit components and electronic systems. Students demonstrate this outcome when they use these applications.

Outcome EET-D

Title: Test & Troubleshoot

Statement: An ability to test, troubleshoot and repair electronic circuits.

Definition: Students demonstrate this outcome when they use test equipment such as digital voltmeters, oscilloscopes, signal generators, and power supplies to measure the characteristics of an electrical system. In addition, students must demonstrate logical, deductive reasoning and an understanding of circuit behavior to make and test hypotheses about the causes of circuit malfunctions and then repair the circuit.

Outcome EET-E

Title: Teamwork

Statement: An ability to work effectively in groups.

Definition: EET students must be able to work effectively in multidisciplinary groups. Students demonstrate this outcome when they can identify the different roles group members can fulfill, recognize and respect different personality styles, display leadership qualities, and reconcile differences. Simply working in teams is does not demonstrate teamwork unless there is explicit attention given to teamwork concepts, issues and skills.

Outcome EET-F

Title: Communication

Statement: An ability to communicate effectively.

Definition: EET students must be able to communicate to other technical professionals, managers, and the general public. They must have good writing and speaking skills and be able to create effective visual presentations. They must be able to communicate technical information through circuit diagrams, programming flowcharts, ladder logic diagrams, timing diagrams, and other graphical forms.

Outcomes EET-G, H, I are assessed jointly with other departments teaching general education courses and changes implemented

- a. Formative Assessment Methods(s) and Description: a measurable indicator of student in-progress success in attaining the stated learning outcome(s).

Both knowledge and skill competencies are defined for each EET course. All courses assess skills through quizzes, a mid-term exam and a final exam along with completion of a course project. The beginning level courses require group projects while the advance courses require individual design projects. Every two hundred level EET course has a design project for application at the end of the course. In addition, every EET course has a laboratory examination as part of the final examination. Laboratory exercises are an integral part of each course. Departmentally developed laboratory manuals are available for each course. All courses require students to use simulation and analysis software.

EET faculty have selected a number of courses for formative assessment at both the 100 and 200 levels: EET 114, 115, 155, and 207. Faculty are using a variety of assessment methods including student feedback through pre and post course surveys and evaluation of course projects.

- b. Summative Assessment Method(s) and Description: a measurable indicator of end-of-program success in attaining the stated program learning outcome(s).

EET 278 is the capstone course for EET majors. The capstone course has been part of the program since the winter quarter of 1995. Based upon the department's experience in offering a capstone course, the department continues to modify the capstone based on student feedback from outcomes assessment. The Engineering Division, in conjunction with the League for Innovation, is developing an annual "Capstone Project" book. Selected capstone projects from each program in the Engineering Division will be published to promote the quality of work and capabilities of engineering students.

The department chairperson conducts exit interviews of all graduates of the EET program. The purpose of the exit interviews is to get feedback on specific aspects of the program including program issues, faculty, facilities, counseling, coop experiences, and future career plans.

Every two years the department conducts a graduate and employer survey related to program issues, faculty, facilities, counseling, and coop experiences.

EET participates in the Tech Prep program. All Tech Prep students are required to complete a co-op experience in a local industry. EET 270 (EET Internship) is now a required course in the program.

IV. Results: A description of the actual results of overall student performance gathered from the summative assessment(s). (see III.b.)

In the capstone course, the design element has been made optional for students. EET technicians are seldom required to do electrical design; therefore, the assessment course has been revised to match the job description and job requirements.

Feedback from transfer programs at UD, from employer surveys, and from graduates has been very positive. The department has a good placement rate and employers

indicate that SCC students do not need additional training on using equipment when they begin their jobs.

A large number of students have signed up or transferred for the dual admission with University of Dayton in the Electronics and Computer Engineering Technology program.

- V. **Analysis/Actions:** From analysis of your summative assessment results, do you plan to or have you made any adjustments to your program learning outcomes, methodologies, curriculum, etc.? If yes, describe. If no, explain.

The capstone (EET 278) prepares students to take the national certification examinations as a benchmark. The capstone course is a four-credit hour course that emphasizes assembly, testing, and troubleshooting of a project. Review, via self-study of learning outcomes provided by the instructor, is now the responsibility of the student and no longer part of the capstone course. The choice to test or the outcome of the testing does not affect the graduation status of the student.

Formative assessment data, especially the results of student feedback, have informed the current curriculum deliberations. Formative assessment data has also led to the incorporation of more simulation software within the EET curriculum. Finally, as a result of the student/employer feedback for EET 131 and EET 251, the department now includes PLD (Programmable Logic Devices).

The department is working with a number of college initiatives including the Learning College, Internet courses, and multi-media delivery. All courses now have a large required computer based component such as the use of simulation software and/or the Internet. Most faculty members make extensive use of the multimedia podiums and/or mobile computer lab. Over 800 students use the mobile computer lab each quarter. The courses are still traditional in terms of content, but the department is using as many alternative methods as possible to reach students who don't respond well to pencil and paper. A larger lab component is also being emphasized in each course.

The department has developed its own *Continuous Improvement Plan*, EET-CIP, which is based on the Plan-Do-Study-Act model. It is a comprehensive and very detailed documentation process done annually. It includes a Program Outcomes Matrix as well as a Course Update Information Form, used for courses under assessment. The department acts upon the results of the data collected.

- VI. **General Education:** Are you using any tool(s) to assess any of the three primary general education outcomes* (communication, thinking, values/citizenship)? If so, describe.

- a. Where within the major do you assess written communication? Describe the assessment method(s) used. Describe assessment results if available.

Every course requires students to write at least three technical lab reports. The EET 198 course prepares students for technical lab report writing. EET 116 also has a writing component, which prepares students. EET 278 uses a required technical writing textbook.

- b. Where within the major do you assess oral communication? Describe the assessment method(s) used. Describe assessment results if available.

EET 150 and EET 278 require students to give class presentations. Oral presentations are part of the capstone; every student writes a technical report and gives a 5-10 minute oral presentation at the end of the project work. The department uses the oral communication checklist to measure skills in the capstone course.

- c. Where within the major do you assess thinking? Thinking might include inventing new problems, seeing relationships and/or implications, respecting other approaches, demonstrating clarity and/or integrity, or recognizing assumptions. Describe the assessment method(s) used. Describe assessment results if available.

Thinking skills are incorporated into every course. The department uses an integrated approach to developing thinking skills. Students study a topic in lecture and then apply logical thinking by using simulation software to solve problems. Lab exercises develop analytical and trouble-shooting skills. Creative thinking is often evidenced in the capstone course through completion of work-related projects that are pursued at the option of the student.

- d. Where within the major do you assess values/citizenship/community? These activities might include behaviors, perspective, awareness, responsibility, teamwork, ethical/professional standards, service learning or community participation. Describe the assessment method(s) used. Describe assessment results if available.

The IEEE student chapter hosts speakers every quarter that address values and ethics within the industry. Students have been involved in community service through volunteering to upgrade emergency alert systems by Professor Lynden McIntyre. Students who complete work-related projects in the capstone course return use of their expertise back to the community. Students may opt do complete their capstone project at their place of employment within the confines of the course requirements.

- * Note: The oral communication checklist and the written communication checklist developed by the General Education Committee were adopted for college-wide use during the 1997-98 academic year by Academic Council. Thinking Guidelines developed by the General Education Committee are being piloted by faculty during the 1998-99 academic year.