



College of Engineering, Technology, and Computer Science Electrical and Computer Engineering Technology Department Assessment and Continuous Program Improvement Plan

1. Introduction

The department of Electrical and Computer Engineering Technology (ECET) in the college of Engineering, Technology, and Computer Science (ETCS), serves the needs of students, industry, and the community in northeastern Indiana. The department offers Bachelor of Science (B.S.) degrees in Electrical Engineering Technology (EET) and Computer Engineering Technology (CPET), and Associate of Science (A.S.) degree in Electrical Engineering Technology. The EET programs are accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET¹) and accreditation preparations are underway for the CPET program.

The two-year A.S. degree EET program is a combination of courses in electricity, electronics, computers, mathematics, science, and general academic areas. The program helps students prepare for employment as electrical/electronic or computer technicians, and provides knowledge in fields such as communication electronics, industrial electronics, military electronics, computer electronics, automation, electronics servicing, and electrical power.

The B.S. degree in EET prepares students for careers in many fields of engineering in electronics or computer related industries, manufacturing, or any business that uses electric power, electronic communications, and computer networks or computer controlled equipment. The program provides students with advanced study in specialized fields of electronics, telecommunications, and measurement and control. It also provides other courses to build a foundation of technical and non-technical knowledge that is essential in modern industry.

The B.S. degree in CPET prepares students for careers in many fields of engineering in computer or electronics related businesses with an emphasis on computer networks, computer programming, microprocessor/microcontroller programming, or computer controlled equipment. The program provides students with advanced study in specialized computer fields such as networking or microprocessors and includes other courses to build a foundation of technical and non-technical knowledge that is essential in modern industry.

Laboratory experience is an essential part of the curriculum. All programs and options integrate hands-on laboratories with lectures. Distance learning courses, including TV and Internet courses are integrated into the curriculum.

¹ ABET, Inc., 111 Market Place, Suite 1050, Baltimore, MD 21202

TAC/ABET assessment criteria are based on the principles of total quality management and continuous improvement. This assessment/accreditation process requires that each program's mission be consistent with the institutional mission. The mission must be translated into specific program educational objectives and program outcomes that are expected as a result of the educational process. The program outcomes should be measurable and must be assessed regularly. The results of outcomes assessment is used as feedback to make program improvements. Finally, a quality assurance and management process is in place to achieve success.

2. Mission of ECET Department

The mission of the department is to offer high quality undergraduate EET, CPET, and continuing education programs. These programs meet regional needs and include credit and non-credit training in electrical, electronics, computer applications, and computer networking. The department seeks to advance and share knowledge in the areas of electrical, electronic, and computer engineering technology through teaching and creative endeavor, and to work with regional industries to develop and increase technically knowledgeable human resources.

3. ECET Department Strategic Objectives/Goals

- 1) Offer relevant, innovative, and rigorous degree and certificate programs to meet the needs of Northeast Indiana
- 2) Support the campus environment for a diverse community of learners
- 3) Promote the scholarly and creative achievements of faculty and students
- 4) Pursue the continuous quality improvement of the programs within the department

Factors that contribute to meeting these objectives/goals are shown below.

Objective 1: Offer relevant and innovative degree and certificate programs to meet the needs of Northeast Indiana

Measurement methods:

- ECET degree programs are assessed through TAC/ABET. Assessment instrument: TAC/ABET reports
- The department meets with the ECET Industrial Advisory Committee annually to review and revise courses and programs. Assessment instrument: Minutes of meetings
- Program additions and changes occur regularly as reflected in departmental meeting minutes. Assessment instrument: Minutes of meetings

Objective 2: Support campus environment for a diverse community of learners

Measurement methods:

- The department's teaching methods and schedules provide courses, programs, and delivery methods to reach a diverse community of learners and are evaluated during program reviews and accreditation visits. Assessment instrument: Program review documents and TAC/ABET reports
- ECET faculty members meet regularly to assess and revise courses and certificate programs to ensure that new technologies are included in course material for technicians, technologists, engineers, and related professionals. Assessment instrument: Minutes of meetings

Objective 3: Promote the scholarly and creative achievements of faculty and students

Measurement methods:

- Students and ECET faculty are encouraged to collaborate on senior design (creative & research) projects which are evaluated each semester. Assessment instruments: Senior project reports, taped oral presentations, and faculty evaluations of Senior Projects.
- Membership and leadership in professional organizations such as ASEE (American Society for Engineering Education), IEEE (Institute of Electrical and Electronics Engineers), and Tau Alpha Pi (The Engineering Technology Undergraduate Honor organization) are encouraged and reported on annual faculty reviews and on annual reports. Assessment instrument: Annual ECET reports
- Faculty professional publications and presentations are encouraged. Assessment instrument: Annual ECET reports
- Grant applications, by faculty, are encouraged. Assessment instrument: Annual ECET reports

Objective 4: Pursue the continuous improvement of the department

Measurement methods

- Retention is a key factor in continuous improvement and is evaluated regularly. Assessment instrument: Annual reports generated by the Office of Institutional Research.
- Sufficient equipment and software funding are necessary for continuous improvement and this is monitored formally during program reviews and accreditation visits. Assessment instrument: Program review documents and TAC/ABET reviews
- Meeting the needs of industry is important to continuous improvement and is evaluated using alumni surveys and meetings of the industrial advisory committee. Assessment instruments: Alumni surveys, employer surveys, and minutes of Industrial Advisory Committee meetings.

4. ECET Program Educational Objectives

The TAC/ABET outcome-based accreditation, first applied to the A.S. and B.S. in EET in 2004, assures quality education of engineering technology students. This approach focuses on inputs from constituencies, the teaching-learning process and outcomes, student achievement, graduation, employment, faculty qualifications and development, supporting facilities and resources, and continuous improvement. Accreditation decisions are based solely on the TAC/ABET criteria, policies and procedures as defined in the ABET “Accreditation Policy and Procedure Manual” and “Criteria for Accrediting Engineering Technology Programs” for evaluation during the annual accreditation cycle.

TAC/ABET defines program education objectives as

“... broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve.”

ECET program educational objectives are consistent with the mission of Indiana University-Purdue University Fort Wayne, and the College of Engineering, Technology, and Computer Science and describe the expected skills, knowledge, and abilities that students require to be successful during the initial years after graduation. These Program Educational Objectives were developed with the IPFW Strategic Objectives/Goals in mind and are closely related to the Program Outcomes. Assessment of these objectives is coupled to assessment of the program and course outcomes using the Tables developed below. ECET Program Educational Objectives for each degree program are:

A.S. EET Program Educational Objectives

- 1) To provide students with the fundamental and emerging mathematical, scientific, engineering, and technical skills necessary to function as an electrical, electronic, computer, or engineering technician.
- 2) To prepare students with knowledge, skills, and techniques in the building, testing, operation, and maintenance of electronic/computer systems.
- 3) To ensure that students have the knowledge and ability to continue learning, either on-the-job or in a B.S. degree program.
- 4) To provide students with communications skills necessary to function effectively as a member of an engineering team.
- 5) To enable students to function as responsible members of society with an awareness of the social, ethical, and global impact of their work.

B.S. EET Program Educational Objectives

- 1) To ensure that students have the knowledge and ability to function as a member of a technical staff who can use current industrial practices and design procedures for development, implementation, and project management of electrical/electronic(s) and/or computer-based software and systems.
- 2) To prepare students for career advancement, promotion, and mobility.
- 3) To help students develop the knowledge and ability to continue learning, either on-the-job or in graduate school.
- 4) To prepare students to be contributing members of society and the profession.
- 5) To provide students with skills in teamwork and to recognize ethical responsibilities.

B.S. CPET Program Educational Objectives

1. To ensure that students have the knowledge and ability to function as a member of a technical staff who can use current industrial practices and design procedures for development, implementation, and project management of computer-based software and systems or electrical/electronic(s) hardware and software.
2. To prepare students for career advancement, promotion, and mobility.
3. To help students develop the knowledge and ability to continue learning, either on-the-job or in graduate school.
4. To prepare students to be contributing members of society and the profession.
5. To provide students with skills in teamwork and to recognize ethical responsibilities.

5. ECET Program Outcomes

ECET program outcomes are based on TAC/ABET program outcomes which are defined as "... narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire in their matriculation through the program."

The TAC/ABET Criteria for Accrediting Engineering Technology Programs states that each program must demonstrate that graduates have:

- a. an appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines,
- b. an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology,
- c. an ability to conduct, analyze and interpret experiments and apply experimental results to improve processes,

- d. an ability to apply creativity in the design of systems, components or processes appropriate to program objectives,
- e. an ability to function effectively on teams,
- f. an ability to identify, analyze and solve technical problems,
- g. an ability to communicate effectively,
- h. a recognition of the need for, and an ability to engage in lifelong learning,
- i. an ability to understand professional, ethical and social responsibilities,
- j. a respect for diversity and a knowledge of contemporary professional, societal and global issues, and
- k. a commitment to quality, timeliness, and continuous improvement.

Achievement of these program outcomes should show that the graduate is equipped to achieve the program educational objectives. ECET program outcomes are statements that describe what students are expected to know and be able to do by the time of graduation. These are related to the skills, knowledge and behaviors that students acquire in their matriculation through the program. Assessment of ECET program outcomes and TAC/ABET program outcomes is simultaneous and is completed as described using the tables and instruments described below:

A.S. Electrical Engineering Technology - Program Outcomes

Graduates will have:

- a. an appropriate mastery of the knowledge, techniques, skills and modern tools of electrical engineering technology,
- b. an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology,
- c. an ability to conduct, analyze and interpret experiments and apply experimental results to improve processes,
- d. an ability to apply creativity in the design of systems, components or processes appropriate to program objectives,
- e. an ability to function effectively on teams,
- f. an ability to identify, analyze and solve technical problems,
- g1. an ability to communicate effectively in writing.
- g2. an ability to communicate effectively in oral presentation.
- h. a recognition of the need for, and an ability to engage in lifelong learning,
- i. an ability to understand professional, ethical and social responsibilities,
- j1. the knowledge of and respect for diverse backgrounds
- j2. the knowledge of contemporary societal issues concerning the profession
- j3. the knowledge of contemporary global issues concerning the profession
- k1. a commitment to quality
- k2. a commitment to timeliness
- k3. a commitment to continuous improvement.

The relationships between Program Educational Objectives and Program Outcomes for the A.S. in EET are shown in Table 1 below:

Table 1: Program Educational Objectives vs Program Outcomes

Program Outcomes: Educational Objectives	a	b	c	d	e	f	g1	g2	h	i	j1	j2	j3	k1	k2	k3
1. To provide students with the fundamental and emerging mathematical, scientific, engineering, and technical skills necessary to function as an electrical, electronic, computer, or engineering technician.	X	X				X										
2. To prepare students with knowledge, skills, and techniques in the building, testing, operation, and maintenance of electronic/computer systems		X	X	X		X	X	X	X					X	X	X
3. To ensure that students have the knowledge and ability to continue learning, either on-the-job or in a B.S. degree program	X	X	X	X	X	X			X					X	X	X
4. To provide students with communications skills necessary to function effectively as a member of an engineering team					X		X	X		X	X	X	X			
5. To enable students to function as responsible members of society with an awareness of the social, ethical, and global impact of their work									X	X	X	X	X			

B.S. Electrical Engineering Technology - Program Outcomes

Graduates will have:

- a. an appropriate mastery of the knowledge, techniques, skills and modern tools of electrical engineering technology,
- b. an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology,
- c. an ability to conduct, analyze and interpret experiments and apply experimental results to improve processes,
- d. an ability to apply creativity in the design of systems, components or processes appropriate to program objectives,
- e. an ability to function effectively on teams,
- f. an ability to identify, analyze and solve technical problems,
- g1. an ability to communicate effectively in writing.
- g2. an ability to communicate effectively in oral presentation.
- h. a recognition of the need for, and an ability to engage in lifelong learning,
- i. an ability to understand professional, ethical and social responsibilities,
- j1. the knowledge of and respect for diverse backgrounds

- j2. the knowledge of contemporary societal issues concerning the profession
- j3. the knowledge of contemporary global issues concerning the profession
- k1. a commitment to quality
- k2. a commitment to timeliness
- k3. a commitment to continuous improvement.

Relationships between Program Educational Objectives and Program Outcomes for the B.S. Electrical Engineering Technology Program are shown in Table 2 below:

Table 2: Program Educational Objectives vs Program Outcomes

Program Outcomes: Educational Objectives	a	b	c	d	e	f	g1	g2	h	i	j1	j2	j3	k1	k2	k3
1. To ensure that students have the knowledge and ability to function as a member of a technical staff who can use current industrial practices and design procedures for development, implementation, and project management of electrical/electronic(s) and/or computer-based software and systems	X	X	X	X	X	X										
2. To prepare students for career advancement, promotion, and mobility				X		X	X	X	X					X	X	X
3. To help students develop the knowledge and ability to continue learning, either on-the-job or in graduate school	X	X	X	X	X	X			X					X	X	X
4. To prepare students to be contributing members of society and the profession							X	X		X	X	X	X			
5. To provide students with skills in teamwork and to recognize ethical responsibilities					X					X	X	X	X			

B.S. Computer Engineering Technology - Program Outcomes

Graduates will have:

- a. an appropriate mastery of the knowledge, techniques, skills and modern tools of computer engineering technology,
- b. an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology,
- c. an ability to conduct, analyze and interpret experiments and apply experimental results to improve processes,
- d. an ability to apply creativity in the design of systems, components or processes appropriate to program objectives,
- e. an ability to function effectively on teams,
- f. an ability to identify, analyze and solve technical problems,

- g1. an ability to communicate effectively in writing.
- g2. an ability to communicate effectively in oral presentation.
- h. a recognition of the need for, and an ability to engage in lifelong learning,
- i. an ability to understand professional, ethical and social responsibilities,
- j1. the knowledge of and respect for diverse backgrounds
- j2. the knowledge of contemporary societal issues concerning the profession
- j3. the knowledge of contemporary global issues concerning the profession
- k1. a commitment to quality
- k2. a commitment to timeliness
- k3. a commitment to continuous improvement.

Relationships between Program Educational Objectives and Program Outcomes for the B.S. Computer Engineering Technology Program are shown in Table 3 below:

Table 3: Program Educational Objectives vs Program Outcomes

Program Outcomes: Educational Objectives	a	b	c	d	e	f	g1	g2	h	i	j1	j2	j3	k1	k2	k3
1. To ensure that students have the knowledge and ability to function as a member of a technical staff who can use current industrial practices and design procedures for development, implementation, and project management of computer-based software and systems or electrical/electronic(s) hardware and software	X	X	X	X	X	X										
2. To prepare students for career advancement, promotion, and mobility				X		X	X	X	X					X	X	X
3. To help students develop the knowledge and ability to continue learning, either on-the-job or in graduate school	X	X	X	X	X	X			X					X	X	X
4. To prepare students to be contributing members of society and the profession							X	X		X	X	X	X			
5. To provide students with skills in teamwork and to recognize ethical responsibilities					X					X	X	X	X			

6. Assessment and Evaluation

a. Degree Programs

Relationships between courses and program outcomes for degree programs are shown in Table 4 below. Note that individual course outcomes are evaluated each semester and the department assessment coordinator maintains an up-to-date curriculum map.

Table 4: Courses vs Program Outcomes (Curriculum Map)

TAC/ABET Outcomes Course	a	b	c	d	e	f	g1	g2	h	i	j1	j2	j3	k1	k2	k3
<i>Analog</i>																
<i>ECET 107 CPET 101</i>	X		X			X	X		X					X	X	
<i>ECET 157</i>	X		X			X								X	X	
<i>ECET 207</i>	X		X			X								X	X	
<i>ECET 231</i>	X	X	X	X		X				X				X	X	
<i>ECET 302</i>	X	X	X	X	X	X	X	X						X	X	X
<i>ECET 303</i>	X	X	X	X	X	X	X	X						X	X	
<i>ECET 307</i>	X	X	X	X	X	X	X		X	X				X	X	
<i>Digital/Microprocessor</i>																
<i>ECET 111</i>	X		X		X	X	X		X					X	X	
<i>ECET 146</i>	X	X	X	X	X	X	X							X	X	
<i>ECET 205</i>	X	X	X	X		X								X	X	
<i>ECET 357</i>	X	X	X	X	X	X	X		X	X				X	X	

c. an ability to conduct, analyze and interpret experiments and apply experimental results to improve processes	ECET 296	YES	YES
d. an ability to apply creativity in the design of systems, components or processes appropriate to program objectives	Assess ECET 146, 302, & CPET/ECET 355 & ECET 296		YES
e. an ability to function effectively on teams	Assess ECET 146, 157, CPET 281, & ECET 296		
f. an ability to identify, analyze and solve technical problems	ECET 296	YES	YES
g1. an ability to communicate effectively in writing. g2. an ability to communicate effectively in oral presentation..	Complete ENG W131, COM 114 & ECET 296	YES	YES
h. a recognition of the need for, and an ability to engage in lifelong learning,	ECET 296	YES	YES
i. an ability to understand professional, ethical and social responsibilities,	W131, COM 114, & GenEd Area IV Elective, & ECET 296		
j1. the knowledge of and respect for diverse backgrounds j2. the knowledge of contemporary societal issues concerning the profession j3. the knowledge of contemporary global issues concerning the profession	Complete ENG W131, COM 114, & GenEd Area IV Elective, & ECET 296		
k1. a commitment to quality k2. a commitment to timeliness k3. a commitment to continuous improvement	ECET 296		

Table 6: Assessments to be completed for B.S. EET Program Outcomes

B.S. EET Outcomes	Course Assessments	Graduate Exit Survey	Alumni & Employer Surveys
a. an appropriate mastery of the knowledge, techniques, skills and modern tools of electrical engineering technology.	ECET 307, 357, ECET 355, IET 105 & Senior Design	YES	
b. an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology	ECET 307, 357 , ECET 355 & Senior Design, Completion of MA 321 & CHM 111	YES	YES
c. an ability to conduct, analyze and interpret experiments and apply experimental results to improve processes	ECET 307, 357, ECET 355 & Senior Design	YES	YES
d. an ability to apply creativity in the design of systems, components or processes appropriate to program objectives	ECET 470 & Senior Design		YES
e. an ability to function effectively on teams	ECET 470 & Senior Design		
f. an ability to identify, analyze and solve technical problems	ECET 470 & Senior Design, & ENG W421	YES	YES
g1. an ability to communicate effectively in writing. g2. an ability to communicate effectively in oral presentation..	ECET 470 & ECET 491	YES	YES
h. a recognition of the need for, and an ability to engage in lifelong learning,	ECET 470, IET 105 & Senior Design		YES
i. an ability to understand professional, ethical and social responsibilities,	ECET 470 & Senior Design, IET 105, ENG W421 and completion of GenEd Area III, IV, & V courses	YES	
j1. the knowledge of and respect for diverse backgrounds j2. the knowledge of contemporary societal issues concerning the profession j3. the knowledge of contemporary global issues concerning the profession	Senior Design, IET 105, ENG W421 and completion of GenEd Area III, IV, & V courses	YES	
k1. a commitment to quality k2. a commitment to timeliness k3. a commitment to continuous improvement	IET 105 and completion of GenEd Area III, IV, & V courses	YES	YES

Table 7: Assessments to be completed for B.S. CPET Program Outcomes

B.S. CPET Outcomes	Course Assessments	Graduate Exit Survey	Alumni & Employer Surveys
a. an appropriate mastery of the knowledge, techniques, skills and modern tools of computer engineering technology.	CPET 355, IET 105, CPET 364 & Senior Design	YES	
b. an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology	CPET 355 CPET 364 & CPET 491 & Completion of MA 175 & CHM 111	YES	YES
c. an ability to conduct, analyze and interpret experiments and apply experimental results to improve processes	CPET 355 CPET 364 & Senior Design	YES	YES
d. an ability to apply creativity in the design of systems, components or processes appropriate to program objectives	CPET 470 & Senior Design		YES
e. an ability to function effectively on teams	CPET 470 & Senior Design		
f. an ability to identify, analyze and solve technical problems	CPET 470 & Senior Design	YES	YES
g1. an ability to communicate effectively in writing. g2. an ability to communicate effectively in oral presentation..	CPET 470 & Senior Design	YES	YES
h. a recognition of the need for, and an ability to engage in lifelong learning,	CPET 470, IET 105 & Senior Design		YES
i. an ability to understand professional, ethical and social responsibilities,	CPET 470, Senior Design, IET105, and completion of GenEd Area III, IV, & V courses	YES	
j1. the knowledge of and respect for diverse backgrounds j2. the knowledge of contemporary societal issues concerning the profession j3. the knowledge of contemporary global issues concerning the profession	IET 105 and completion of GenEd Area III, IV, & V courses & Senior Design	YES	
k1. a commitment to quality k2. a commitment to timeliness k3. a commitment to continuous improvement	IET 105 and completion of GenEd Area III, IV, & V courses & Senior Design	YES	YES

b. Certificate Programs

The department has four active certificate programs and assessment of these programs follows the general process used for the degree programs. Assessment of each of these certificates will be based on the assessment instruments shown in Table 8.

- **Certificate in Advanced Microprocessors**

Recipients of the certificate in advanced microprocessors will have

- 1) the fundamental knowledge, skills, and techniques necessary to program and interface microcontrollers and microprocessors.
- 2) the knowledge and ability to continue learning other languages or microprocessor based devices.

- **Certificate in Electronic Communications**

Recipients of the certificate in electronic communications will have

- 1) the fundamental knowledge, skills, and techniques necessary to understand and relate scientific principles to applications using current electronic communications devices, and
- 2) the knowledge and ability to continue learning the principles and applications of future communications devices.

- **Certificate in Computer Controlled Systems**

Recipients of the certificate in computer controlled systems will have

- 1) the fundamental knowledge, skills, and techniques necessary to understand and relate scientific principles to applications using current computer controlled devices, and
- 2) the knowledge and ability to continue learning the principles and applications of future computer controlled devices.

- **Certificate in Computer Networking**

Recipients of the certificate in computer networking will have

- 1) the fundamental knowledge, skills, and techniques necessary to understand and relate scientific principles to applications using current computer networking software and equipment, and
- 2) the knowledge and ability to continue learning the principles and applications of future network operating systems and devices.

Table 8: Assessment of Certificate Programs

Certificate	Assessment 1	Assessment 2	Assessment 3
Advanced Microprocessor	Assess ECET 305	Assessment of Advanced Microprocessor Project	Certificate Exit Survey
Electronic Communications	Assess ECET 403	Assessment of Electronic Communications Project	Certificate Exit Survey
Computer Controlled Systems	Assess ECET 302	Assessment of Computer Controlled Systems Project	Certificate Exit Survey
Computer Networking	Assess CPET 364	Assessment of Computer Networking Project	Certificate Exit Survey

7. Continuous Program Improvement

This assessment plan provides information to enable ECET faculty and staff to engage in continuous program improvement. ECET faculty members will evaluate the results of assessment measures, assessment reports, Industrial Advisory Committee meetings annually and will evaluate feedback from Program reviews, and TAC/ABET evaluation visits upon receipt. These evaluations will provide the knowledge and data necessary to enable the curriculum, faculty teaching and development, student learning outcomes, laboratory facilities, and administrative support and resources to be assessed. Changes made as a result of these evaluations will enable continuous program improvement.

Assessment timing:

- Selected courses will be assessed annually
- Capstone projects will be assessed each semester
- Graduate exit surveys will be conducted annually
- Alumni and Employer surveys will be conducted biennially
- Industrial Advisory Committee meetings will be conducted annually