

ELECTRICAL/ELECTRONICS ENGINEERING TECHNOLOGY ASSESSMENT MATERIALS FOR 2009 – 2010 Academic Year

Purpose

The Electrical/Electronics Engineering Technology (EET) program offered by Zane State College is designed to prepare/enable graduates to either obtain entry-level employment as electronics technicians, or pursue a bachelor's degree in an engineering technology, or pass the Armed Services Vocational Aptitude Battery and pursue a career in one of the branches of the United States military.

Student Competencies

An entry-level paraprofessional with an associate degree in Electrical/Electronics Engineering Technology from Zane State College will be able to:

- A. Perform essential analytical skills using a calculator and/or computer software to analyze analog and digital circuits.
- B. Collect, analyze, and present data from electronic application circuits in both written and oral report forms.
- C. Construct, troubleshoot, and analyze electronic circuits using oscilloscopes, multimeters, function generators, and frequency counters.
- D. Design circuits, subassemblies, or electrical/electronic products that will meet the requirements of a customer.
- E. Consistently demonstrate ethical behavior and a positive attitude while working with people of differing age, gender, and background.
- F. Contribute effectively to the production of a quality product or service in a timely manner as a member of an organization's work group or team by maintaining technically up-to-date skills through on-the-job training and/or continuing education.

Tools Measuring Student Competencies

- ❑ **PLC Project Folder:** The project folder in EET 251 is a collection of raw data from experimentation, calibration curves, and manufacturer's data sheets. Students must organize data into appropriate charts and graphs. The project folder also includes a project proposal and daily memoranda outlining progress towards project completion. Students are evaluated on their written communication ability. Schematic diagrams and wiring diagrams for the subassemblies in the project are evaluated for accuracy, completeness, layout, labeling, and functionality (utility).
- ❑ **PLC Design Project:** Working in design teams, EET 251 students will complete PLC-controlled design projects in accordance with specifications provided by the instructor. Students will design system hardware and software, perform PLC programming, assemble and wire their project, and troubleshoot in a systematic manner as required.
- ❑ **PLC Project Oral Presentations and Demonstrations:** In EET 251 students give an oral presentation utilizing Power Point followed by a demonstration of a PLC-controlled product/assembly/subassembly designed and built as part of a four-week team design project.
- ❑ **EET 111 Lab Practical:** Given schematic diagrams, student will construct series, parallel, and series-parallel circuits and use digital and analog multimeters to collect resistance, voltage, and current data.
- ❑ **EET 123 Lab Practical:** Given a schematic diagram, the student will construct a sinusoidal-powered R-C, R-L, or RLC circuit using a function generator and frequency counter. The student will evaluate data collected from this circuit using the digital oscilloscope.
- ❑ **EET 211 Lab Practical:** Given a schematic diagram, the student will be expected to construct an operational industrial control circuit. In addition to functionality, the circuit will also be evaluated for appropriate layout, organization, and data acquisition via oscilloscope.
- ❑ **Soldering Demonstration:** The quality of student soldering of the A.M. radio project in EET 230 will be evaluated.
- ❑ **A.M. Radio Project Folder:** The project folder in EET 230 is a collection of data from the A.M. radio project. Students collect circuit/subassembly data using the digital multimeter, function generator, arbitrary waveform generator, frequency counter, and digital oscilloscope during the construction of an A.M. superheterodyne receiver.

- **A.M. Radio Project:** Students construct an A.M. radio given a printed wiring board, components, soldering/desoldering equipment, digital multimeter, function generator, arbitrary waveform generator, frequency counter, RLC meter, and digital oscilloscope.
- **A.M. Radio Project Data Sheets and Oscilloscope Waveforms:** Students must complete and submit in an organized format measured experimental data in Microsoft Word tables or Excel spreadsheets. Oscilloscope voltage waveforms must be captured and pasted into Microsoft Word with labeling to identify the waveforms for all stages of the A.M. radio project.
- **Employer Survey:** A two-year rotational survey of employers of recent EET graduates will be administered. The survey will cover all three competencies and also include an overall category of job preparedness.
- **CCNA Exam Results (external measure):** Student pass rate on Cisco Certified Network Associate Exam.
- **FCC Technician No-Code amateur exam (external measure):** Student pass rate on Amateur Radio Relay League FCC Technician No-Code Exam.

**Electrical/Electronics Engineering Technology
Competency Statement Findings
Summer 2009 through Spring 2010**

Zane State College students will be able to:

A. Perform essential analytical skills using a calculator and/or computer software to analyze analog and digital circuits.

Assessment Tools	Assessment Standards	Assessment Standard Findings	Criteria Met Yes/No	Action Taken
A.M. radio project data sheets and oscilloscope waveforms in EET 230	90% of the course completers will satisfy the requirements of the EET 230 radio project grading sheet for presentation of experimental data.	78.7% 37/47	No	Old AM radio project no longer available from vendor, Elenco. Went to new board having both an AM and FM portion. AM only, required; but functional FM receiver considered for extra credit. Student also using all new Agilent scopes, generators, D.C. power supplies, and multimeters for the first time. College implemented limit on laser printing, so faculty member required to look at student's work on

				computer in PC lab limiting time on helping with troubleshooting.
Cisco Certified Network Associate (CCNA) Exam	50% of EET 157 course completers taking CCNA Exam will pass.	50% 1/2	Yes	Despite cost to students to take exam, continue to emphasize benefit of taking and passing exam.
ARRL FCC Technician No-Code Exam	95% of EET 230 students will pass the exam.	97.9% 46/47	Yes	Time permitting, next year try to give practice final so they can know how much they actually need to review for the "real" ARRL exam.

B. Collect, analyze, and present data from electronic application circuits in both written and oral report forms.

Assessment Tools	Assessment Standards	Assessment Standard Findings	Criteria Met Yes/No	Action Taken
A.M. radio project folder	80% of course completers will meet 90% or more of the grading criteria for A.M. radio project folder in EET 230.	68% 32/47	No	As noted above, students “shot themselves in the foot” by damaging parts with poor parts handling, soldering habits. This put students behind as they had to wait to receive replacement parts from the manufacturer such as tuning coils not available in the EET lab. Students’ time management skills continue to be a problem. As quarter progressed students started to become more at ease with the new lab equipment;

				however, dozens of times the instructor found default settings of the equipment that had been changed and stored by the students without permission and had to be restored by the instructor taking time away from helping students. This class needs a good lab assistant to help the instructor. Added a detailed outline of the expected Table of Contents for the project.
PLC project folder	75% of all design teams will complete a project folder meeting at least 90% of the instructor's requirements in EET 251.	71.4% 5/7	No	Much better folders than last year. Particularly overall organization. One group fell one point short of 90% goal. Both groups not

				meeting 90% criteria had one less day due to holiday to complete project and were the two weakest groups. Further comments in narrative summary.
PLC project oral presentations and demonstrations	75% of course completers will meet 80% or more of the requirements of the oral presentation and demonstration phases of the PLC design project in EET 251.	92.3% 24/26	Yes	This is the first year student were required to use Power Point. Lots of effort was put into the PPT. Should have been more opportunity to practice beforehand.
Alumni Survey	80% of the graduates will rate themselves above average on 11 or more of the 13 post-graduate criteria and none below average.	100% 10/10	Yes	None

C. Construct, troubleshoot, and analyze electronic circuits using oscilloscopes, multimeters, function generators, and frequency counters.

Assessment Tools	Assessment Standards	Assessment Standard Findings	Criteria Met Yes/No	Action Taken
EET 211 lab practical	80% of all course completers will demonstrate the knowledge, skills, and attitudes reflected in the objectives pertinent to the lab practical in EET 211 at a level of 90% or better.	83.3% 10/12	Yes	An emphasis was placed on proper measurements using the ground straps on the oscilloscope. An emphasis was placed on each student using the equipment rather than the student relying on his/her lab partner for proper operation of the equipment throughout the class including function generators, multimeters and oscilloscopes.

Soldering demonstration in EET 230 A.M. radio project	80% of all course completers will satisfy the requirements of the soldering component of the A.M. radio project in EET 230 at a level of 90% or better.	80.9% 38/47	Yes	Students “jumping right into” the project without soldering practice had difficulties. After practicing, their performance improved. Most did not use heat sinks as directed and caused heat damage to parts early on in the project until the “learned the hard way” to do what they had been told. Had to work with students to determine ideal temperature setting for the soldering irons depending on part size.
EET 111 lab practical	80% of course completers will satisfy the requirements of the EET 111 lab practical at a level of 80% or better.	79.1% 68/86	No	New multimeters and D.C. power supplies used by faculty and EET 111 students for

				<p>the first time. Blew fuses in three new VOMs when trying to measure current. Discussed with Mr. Kerr and Mr. Bailey what happened in their labs. All EET 111 labs and lab practical modified to accommodate new equipment. A lab practical practice lab was implemented the week before the lab final simulating the lab practical conditions. Mr. Kerr was pleased with the “diagnostic” results produced by this activity revealing student deficiencies prior to the real lab final. Out of five lab</p>
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				sections, only one group failed to meet the established criteria (goal).
EET 123 lab practical	80% of course completers will satisfy the requirements of the EET 123 lab practical at a level of 80% or better.	84.5% 49/58	Yes	Digital scopes used on lab practical for only the second year.
A.M. radio receiver project	90% of course completers will construct an operational radio receiver capable of reproducing an intelligible audio signal from at least three radio stations in a given geographic area without external antenna.	91.5% 43/47	Yes	There has been a learning curve on the new scopes, power supplies, multimeters, and waveform generators. The up side is students can now save waveforms to a flash drive. However, the college now charges a few to print from our laser printer. Now the instructor has to have students show waveforms on the computer for approval rather

				than a laser copy which takes more time from lab.
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D. Design circuits, subassemblies, or electrical/electronic products that will meet the requirements of a customer.

Assessment Tools	Assessment Standards	Assessment Standard Findings	Criteria Met Yes/No	Action Taken
PLC design project	75% of design teams will design a PLC-controlled product that meets at least 90% of the instructor's requirements in EET 251.	100% 7/7	Yes	Need to give team manager guidance on delineating assignments amongst team members. Inconsistent use of time allotted.

E. Consistently demonstrate ethical behavior and a positive attitude while working with people of differing age, gender, and background.

Assessment Tools	Assessment Standards	Assessment Standard Findings	Criteria Met Yes/No	Action Taken
Graduate Exit Survey	<p>80% of graduate responses will reflect a respect for diversity by age.</p> <p>80% of graduate responses will reflect a respect for diversity by gender.</p>	<p>84.6% 22/26</p> <p>77% 20/26</p>	Yes	<p>Inferential observations of male and female students interacting together in group projects suggests that male students are typically respectful of female students. However, casual observation of male-only students in a group outside the classroom suggests that some male students have not yet been satisfactorily indoctrinated by Mr. Davis on the benefits of</p>

				diversity and gender equity in the school and workplace. Mr. Davis will attempt to bring in female graduates as presenters to the classroom during the 2010-2011 year dependent on their availability.
Employer Survey	80% of employers will rate graduates as higher than average in the category of Interpersonal Skills.	80% 4/5	Yes	None
	80% of employers will rate graduates as higher than average in the category of Work Ethics.	100% 5/5		
	80% of employers will rate graduates as higher than average in the category of Attitude.	80% 4/5		
Alumni Survey	80% of graduates will rate themselves as higher than average in the category of Interpersonal Skills.	100% 10/10	Yes	None
	80% of graduates will rate themselves as higher than average	100% 10/10	Yes	

	<p>in the category of Work Ethics.</p> <p>80% of graduates will rate themselves as higher than average in the category of Attitude.</p>	<p>100%</p> <p>10/10</p>	<p>Yes</p>	
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F. Contribute effectively to the production of a quality product or service in a timely manner as a member of an organization’s work group or team by maintaining technically up-to-date skills through on-the-job training and/or continuing education.

Assessment Tools	Assessment Standards	Assessment Standard Findings	Criteria Met Yes/No	Action Taken
Graduate Exit Survey	80% of graduates will respond that their work quality has continuously improved.	100% 26/26	Yes	None.
	80% of graduate responses will reflect the importance of timeliness in the completion of tasks.	100% 26/26		
	80% of graduate responses will reflect the importance of team and individual work quality.	100% 26/26		
Employer Survey	80% of employers will rate graduates as higher than average in the category of Team Work.	80% 4/5	Yes	None.
	80% of employers will rate graduates as higher than average in the category of Technical Skills.	100% 5/5	Yes	
	80% of employers will rate graduates as higher than average in	80% 4/8	Yes	

	<p>the category of Productivity.</p> <p>80% of employers will rate graduates as higher than average in the category of Work Quality.</p>	<p>80%</p> <p>4/5</p>	<p>Yes</p>	
Alumni Survey	<p>80% of graduates will rate themselves as higher than average in the category of Team Work.</p> <p>80% of graduates will rate themselves as higher than average in the category of Technical Skills.</p> <p>80% of graduates will rate themselves as higher than average in the category of Productivity.</p> <p>80% of graduates will rate themselves as higher than average in the category of Work Quality.</p>	<p>100%</p> <p>10/10</p> <p>100%</p> <p>10/10</p> <p>100%</p> <p>10/10</p> <p>100%</p> <p>10/10</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>	

A. Indicators of Program Effectiveness

Electrical/Electronics Engineering Technology program effectiveness will be evidenced by the criteria that are listed below:

1. Ninety percent (90%) of the program graduates will obtain EET technology related employment, transfer to a four-year B.S. program, or enter an electronics position in the armed services within six months after graduation.

Findings: 42/43 (97.67%) employed within the technology or pursuing a bachelor's degree.

Action: None

2. The EET program will continue with external validation via renewed accreditation by the Accrediting Board for Engineering and Technology (TAC-ABET*).

Findings: Continued accreditation.

Action: No immediate action taken. The program coordinator and ENBIT Dean have completed the ABET Self Study Questionnaire in preparation for the Fall 2010 site visit.

3. Eighty percent (80%) of recently hired graduates will be rated by their employers as above average in the overall category of job preparation and none below average.

Findings: 5 of 5 (100%) respondents rated their EET employees above average or excellent on their educational preparation.

Action: No action within the program needed. Employers are reluctant to complete these survey instruments because of concerns related to federal right to privacy laws. In most cases, Mr. Davis had to resort to in-person interviews at the employer's office.

4. Seventy-five percent (75%) of eligible EET students will join the Zane State College student chapter of the IEEE by the completion of their first full academic year.

Findings: 42 of 94 (44.7%) are currently student members of IEEE.

Action: Mr. Bailey has implemented a web invite on the Zane State home page inviting students to join the EET program student club. In the classroom, EET faculty members have been trying to link the importance of IEEE membership to employment with companies such as AEP and the importance to renewed program accreditation.

*The Electrical/Electronics Engineering (EET) Technology program is nationally recognized for its quality. It is a TAC/ABET accredited program (Technology Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, phone 1-410-347-7700. www.abet.org)