ABET SELF-STUDY QUESTIONNAIRE: TEMPLATE FOR A SELF-STUDY REPORT

2019-2020 Review Cycle

ENGINEERING TECHNOLOGY ACCREDITATION COMMISSION

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INTRODUCTION

The Self-Study Report is expected to be a quantitative and qualitative assessment of the strengths and limitations of the program being submitted for review.

The Self-Study Report will provide information critical to a thorough on-site review of the program. Therefore, the report will address the extent to which the program meets applicable ABET Criteria and policies. In so doing, it is necessary that the report address all methods of instructional delivery used for the program, all possible paths that students may take to completion of the degree, and all remote offerings available to students in the program.

Each Commission of ABET provides a *Self-Study Questionnaire* to assist the program in completing the Self-Study Report.

REQUIREMENTS AND PREPARATION

The program name used on the cover of the Self-Study Report **must** be identical to that used in the institutional publications, on the ABET Request for Evaluation (RFE), and on the transcripts of graduates. This will ensure that the program is correctly identified in ABET records and that graduates can be correctly identified as graduating from an accredited program.

Normally, each program requires a Self-Study Report.

While the *Questionnaire* focuses primarily on accreditation criteria, it also includes questions related to certain sections of the ABET *Accreditation Policy and Procedure Manual* (APPM).

While it is important that the overall structure in the *Questionnaire* be retained, it is not necessary to preserve notes or pages of instructions about preparing the Self-Study Report.

A program may use terminology different from that used in the *Questionnaire*.
If different terminology is used, it is important that the Self-Study Report provide notes of explanation to clearly link the terminology in the Report to terminology used in the *Questionnaire*.

Tables in the *Questionnaire* may be modified in format to more clearly present the information for the program. When this is done, it is suggested that a brief explanatory footnote be included about why the table was modified. Rows may be added to or deleted from tables to better accommodate program information.

The **educational unit** is the administrative unit having academic responsibility for the program(s) being reviewed by a given Commission of ABET. For example, if a single program is being reviewed, the educational unit may be the department. If more than one program is being reviewed, the educational unit is the administrative unit responsible for the collective group of programs being reviewed by that Commission.

SUPPLEMENTAL MATERIALS

The following materials are to be supplied in addition to the Self-Study Report:

- The general institution catalog covering course details and other institutional information applicable at the time of the review.
- Promotional brochures or literature describing program offerings of the institution.
- Official academic transcripts of recent graduates. The **official academic transcript** contains a listing of all the courses taken by a graduate, year/semester courses were taken, the grades earned, and degree(s) earned. The Team Chair will request a specific sampling of transcripts for each program and will provide a timeframe in which they should be provided to program evaluators. Each academic transcript is to be accompanied by the program requirements for the graduate and accompanied by worksheets that the program uses to show how the graduate has fulfilled program requirements. Master's degree programs under review must also provide copies of the students' undergraduate academic transcripts that were used to make an admission decision.

SUBMISSION AND DISTRIBUTION OF SELF-STUDY REPORT

NOTE: No email submission is permitted. No hard copy submission will be accepted. No submission on a data stick is permitted. The submission cannot be a combination of hard copy and electronic file.

The Self-Study Report and Supplemental Material should be uploaded as **pdf read-only files via your institution's login access to the ABET website.**
Specific instructions for how to upload your Self-Study and Supplemental Material will be provided well in advance of the due date.

Catalogs that are available only electronically must be submitted in a pdf read-only format. The catalog must be the version available at the time the Self-Study Report is prepared. Web-based versions may not be submitted.

- **To ABET Headquarters via upload by July 1** of the calendar year of the review:

  - Upload **one** Self-Study Report including all appendices for **each** program
  - Upload **one** set of the supplemental materials (**without the academic transcripts**) :

- **The Team Chair and Program Evaluators will be able to access the Self Study through the ABET Accreditation Management System. There will be no need to transmit these materials to the team.**

- **The institution's primary contact will need to coordinate with the Team Chair to confirm where to send a set of transcripts for each program.**

  - Please send an email to accreditation@abet.org if there are any questions.

CONFIDENTIALITY

All information supplied is for the confidential use of ABET and its authorized agents. It will not be disclosed without authorization of the institution concerned, except for summary data not identifiable to a specific institution or documents in the public domain.

TEMPLATE

The template for the Self-Study Report begins on the next page.

ABET
Self-Study Report

for the

Bachelor of Science
Electronics Engineering Technology

at

Fairmont State University

Fairmont, West Virginia

Spring 2019

CONFIDENTIAL

<p style="text-align:center;">Program Self-Study Report
for
ETAC of ABET
Accreditation or Reaccreditation</p>

BACKGROUND INFORMATION

A. Contact Information

List name, mailing address, telephone number, fax number, and e-mail address for the primary pre-visit contact person for the program.

James Vassil, ABET Lead for all Engineering Technology Programs
Fairmont State University
1201 Locust Avenue
Fairmont West Virginia, 26354
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James.Vassil@fairmontstate.edu

B. Program History

Include the year implemented and the date of the last general review. Summarize major program changes with an emphasis on changes occurring since the last general review

Historical Perspective

A review of university academic catalogs reveals the current Electronic Engineering Technology, Bachelors of Science in Engineering Technology (B.S.E.T) program, evolved into a stand-alone academic program in 1976. The historic review of the Bachelor of Science Electronics Engineering Technology degree and chronology of the changes are listed in Table 1. Table 2 contains the original 1976 program curriculum, Table 3 contains the 2012/2013 Program Curriculum, Table 4 contains the 2013/2014 Program Curriculum, and Table 5 contains the current Program curriculum implemented during the 2016-2017 semesters.

Program Changes after Last General Review

ABET's last general review of the Electronics Engineering Technology program was October, 2013. Since that visit, there has been program revisions resulting in major curriculum modifications. In 2012-2013 and in 2016-2017 the program proposed and received approval to make changes that met mandates of the Higher Education Policy Commission, the university, and recommendations of the Industrial Advisory Committee (*see Tables 4 and 5 respectively*). The proposal was designed to align the Electronics Engineering Technology program with the current 120 hour degree requirement and newly approved general studies curriculum and updating the courses according to technology advances. Other changes were based on results of the program's Continuous Improvement Plan.

Note: The most recent academic catalog is appended for review.

Historical Review of Program
Electronics Engineering Technology, BSET

Year	Program Title	Degree	Hours Required	Changes
1976-1978	Electrical - Electronic Technology	BS	128	General Education/Required Related Courses/Concentration
1978-80	Electronics Technology	BS	130	General Studies/Required Related Courses/Technology Core/Concentration
1980-84	Electronics Technology	BS	130	General Studies/Required Related Courses/Technology/Technology Core/Concentration
1984-86	Electronics Engineering Technology	BS	130	Course organization changed to General Requirements and Electronics concentration
1986-88	Electronics Engineering Technology	BS	131	General Requirements/ Requirements-Electronics
1988-90	Electronics Engineering Technology	BS	131	General Studies/Requirements-Electronics
1990-1994	Electronics Engineering Technology	BS	131	TAC/ABET Accredited General Studies Requirement/Requirements-Electronics
1994-2000	Electronics Engineering Technology	BS	132	TAC/ABET Accredited General Studies Requirement/Requirements-Electronics
2000-2001	Electronics Engineering Technology	BS	131	TAC/ABET Accredited General Studies Requirement/Requirements-Electronics
2001-2003	Electronics Engineering Technology	BS	130	TAC/ABET Accredited General Studies Requirement/Requirements-Electronics
2003-2005	Electronics Engineering Technology	BS	130	TAC/ABET Accredited Liberal Studies Requirement/Requirements-Electronics
2005-2013	Electronics Engineering Technology	BS	129	TAC/ABET Accredited

				Liberal Studies Requirement/Requirements-Electronics
2013-2014	Electronics Engineering Technology	BS	120	New Curriculum. Reduction to 60 hours with 10 hours of General Studies
2016 - 2017	Electronics Engineering Technology	BS	120	Updated curriculum to reflect changes in technology
Table 1				

1976 Program Curriculum

Program Title:	Electronics Engineering Technology
Program Degree:	BS
Required Credits:	128 Semester Hours

Required Related Courses:			Credits
General Requirements			
Music or Art	205	Music Appreciation	2
Art	255	History and Appreciation of Art	2
Speech	101	Fundamentals of Speech	3
English	104	Written English	3
	108	Written English	3
	109	Tech Report Writing	3
	250	Survey of English Literature	3
	260	Survey of American Literature	3
Soc. Stu.		Econ, Geography, Hist, Pol Sci, Sociology	12
Phys. Ed.	100	Basic PE	2
Chemistry	101, 102	General Chemistry	8
Physics	101, 102	Intro to Physics	8
Math	101	Applied Technical Math I	3
	102	Applied Technical Math II	3
Business	309	Industrial Organization and Mgmt.	3
	310	Statistics	3
EDP	100	Introduction Electronic Data Processing	3

Required Related Courses:			
Tech	103	Basic Electricity	3
	112	Basic Electronics	4
	121	Drafting	3
	170	Statics	3
	182	Materials and Processes of Ind	3
	190	Industrial Orientation	1
	193	Personnel Prob. & Labor Rel	3
	194	Personnel Administration	3
	270	Strength of Materials	3
	300	Engineering Analysis	4

Concentration:			
Tech	203	Electrical Measurements	4
	210	Intro. To Computer Elec.	2
	315	Industrial Electronics & Controls I	2
	318	Industrial Electronics & Controls II	2
	319	Advanced Electronics	4
	410	Digital Electronics	4

	418	Advanced Elect. Theory	4
Electives			11
		Total Course Related Hours	**128**

Table 2

2012/13 Program Curriculum			
Program Title:	Electronics Engineering Technology		
Program Degree:	BS		
Program Changes: Extensive Modifications **&** Program Categories Consolidated into One -*Required Courses*			
Required Credits: 129 Semester Hours			
			Credits
Required Courses			
CHEM	1101	General Chemistry	4
COMM	2200	Intro to Human Communication	3
COMP	1101	Applied Technical Programming	3
DRFT	1100	Engineering Graphics	3
ECON	2200	Introduction to Economics	3
ENGL	1104	Written English I	3
	1108	Written English II	3
	1109	Tech Report Writing	3
ELEC	1100	Circuit Analysis I	3
	2200	Electronic Shop Practices	3
	2210	Circuit Analysis II	3
	2215	Basic Transistors	3
	2220	Linear Electronics	3
	2230	Digital Electronics	3
	2240	Industrial Electronics	3
	2250	AC-DC Machinery and Controls	3
	2260	Communications Systems	3
	2270	Microcomputer Systems	3
	2280	Programmable Controllers	3
	3300	Advanced Linear Electronics	3
	3310	Advanced Microcomputer Systems	3
	4400	Senior Electronics Project	3
	4410	Data Acquisition & Control Systems	4
MANF	2250	Total Quality and SPC	3
MATH	1101	Applied Technical Math I	3
	1102	Applied Technical Math II	3
PHYS	1101	Introduction to Physics I	4
	1102	Introduction to Physics II	4
SFTY	1100	Safety & Environmental Comp. of Industry	3
TECH	2290	Engineering Analysis I	4
	3300	Engineering Analysis II	4
General Studies Courses			
	Elective	Culture/Civilization Exploration	9
	Elective	Artistic/Creative/Interdisciplinary	6
	Elective	Society Interaction	3
	Elective	Technical	9
	Elective	Free	3
		Total Course Hours	**129**
Table 3			

2013/14 Program Curriculum

Program Title: Electronics Engineering Technology

Program Degree: BS

Program Changes: Extensive Modifications **&** Program Categories Consolidated into One - *Required Courses*

Required Credits: 120 Semester Hours

			Credits
Required Courses			
COMM	2202	Communication in the World of Work	3
COMP	1101	Applied Technical Programming	3
ENGL	1104	Written English I	3
	1108	Written English II	3
	1109	Tech Report Writing	3
ELEC	1100	Circuit Analysis I	3
	2200	Electronic Shop Practices	3
	2210	Circuit Analysis II	3
	2225	Linear Devices	3
	2230	Digital Electronics	3
	2240	Industrial Electronics	3
	2250	AC-DC Machinery and Controls	3
	2260	Communications Systems	3
	2270	Microcomputer Systems	3
	2280	Programmable Controllers	3
	3300	Advanced Linear Electronics	3
	3310	Advanced Microcomputer Systems	3
	4401	Senior Electronics Project I	4
	4402	Senior Electronics Project II	3
HIST	1107	US History I	3
	4410	Data Acquisition & Control Systems	4
MANF	2250	Total Quality and SPC	3
MATH	1113	Statistics	3
	1185	Applied Calculus I	4
	1186	Applied Calculus II	4
PHYS	1101	Introduction to Physics I	4
	1102	Introduction to Physics II	4
SFTY	1100	Safety & Environmental Comp. of Industry	3
TECH	1108	Engineering Graphics	3
General Studies Courses			
	Elective	Category V	3
	Elective	Category VI	3

	Elective	Category VIIA	3
	Elective	Category VIIC	3
	Elective	Category VIII	3
	Elective	Tech	9
	Elective	Free	3
		Total Course Hours	**120**
		Table 4	

2016 – 2017 Program Curriculum

Program Title:	Electronics Engineering Technology		
Program Degree:	BS		
Program Changes:	Extensive Modifications - *Required Courses*		
Required Credits:	120 Semester Hours		

Required Courses			Credits
COMM	2202	Communication in the World of Work	3
COMP	1110 or 1120	Principles of Programming	3
ENGL	1101	Written English I	3
	1103	Tech Report Writing	3
ELEC	1100	Circuit Analysis I	3
	1120	AC/DC Electronic Analysis	3
	2210	Circuit Analysis II	3
	2225	Electronic Devices	3
	2230	Digital Electronics	3
	2240	Industrial Electronics	3
	2250	AC-DC Machinery and Controls	3
	2270	Intro to Microcontroller Systems	3
	2280	Programmable Controllers	3
	3300	Advanced Linear Electronics	3
	3310	Advanced Microcontroller Systems	3
	3360	Communications Systems	3
	4401	Senior Electronics Project I	4
	4402	Senior Electronics Project II	3
	4410	Data Acquisition and Control Systems	4
	4420	Advanced Automation Controller Systems	3
Technical Electives	(Students choose 3 from approved list in catalog)		9
MATH	1510/1530 (per ACT Score)	Applied Technical Math 1	3
	1520/1540 (per ACT Score)	Applied Technical Math 2	3
	2501 or TECH 2290	Calculus 1	4
	2502 or TECH 3300	Calculus 2	4
PHYS	1101	Intro to Physics 1	4
	1102	Intro to Physics 2	4
CHEM	1101	Gen Chemistry	4

General Studies Courses			
	Elective	GS Category 6	3

	Elective	GS Category 8,13	3
	Elective	GS Category 9	3
	Elective	GS Category 10	2
	Elective	GS Category 11	3
	Elective	GS Category 12	3
	Elective	GS Category 14	3
	Elective	GS Category 16	3
		Total Course Hours	**120**
		Table 5	

C. Options

List and describe any options, tracks, concentrations, etc. included in the program.

There are no options, tracks, or concentrations in the Electronics Engineering Technology program.

D. Program Delivery Modes

Describe the delivery modes used by this program, e.g., days, evenings, weekends, cooperative education, traditional lecture/laboratory, off-campus, distance education, web-based, etc.

The Electronics Engineering Technology program is delivered primarily through day, afternoon, and evening course offerings on the main campus at 1201 Locust Avenue, Fairmont, WV. During the summer 2018 and 2019, ELEC 2250 (AC-DC Machinery and Controls) was offered online.

The program's course material is delivered via lecture, laboratory, experiential, and Blackboard methodologies. Even though course material development and delivery is at the discretion of the professor, all faculty must post course information (syllabi) and grades to Blackboard.

E. Program Locations

Include all locations where the program or a portion of the program is regularly offered (this would also include dual degrees, international partnerships, etc.).

The Electronics Engineering Technology program is located on the main campus of Fairmont State University. Most of the program courses are offered in the Engineering Technology building.

F. Public Disclosure

Provide information concerning all the places where the Program Education Objectives (PEOs), Student Outcomes (SOs), annual student enrollment and graduation data are made accessible to the public. This information should be easily found on either the program or institutional website so please provide the URLs.

All program information can be found at the following program website:

https://www.fairmontstate.edu/collegeofscitech/academics/electronics-engineering-technology

G. Deficiencies, Weaknesses or Concerns from Previous Evaluation(s) and the Actions Taken to Address Them

Summarize the Deficiencies, Weaknesses, or Concerns remaining from the most recent ABET Final Statement. Describe the actions taken to address them, including effective dates of actions, if applicable. If this is an initial accreditation, state it is an initial accreditation.

Findings in meeting provisions of the ABET criteria or policies are described below.

Program Concerns

1. Electronics Engineering Faculty Weakness:

2. Classroom usage/availability Weakness:

1. In 2014 another faculty member was added (Thomas M. McLaughlin) to the Electronics Engineering Technology program along with the current faculty member, Mr. Larry Allen to satisfy this weakness. Also, in 2015, another faculty member was hired (Musat Crihalmeanu) to take the place of retiring Professor Mr. Larry Allen.

2. Previous Findings and Criteria: Criterion 7, Facilities, states, "Classrooms, offices, laboratories, and associated equipment must be adequate to support attainment of the student outcomes and to provide an atmosphere conducive to learning." There is currently an effort to distribute space between Fairmont State University and Pierpont Community College. The final allocation of space could be a rigid proportional distribution that does not take into consideration the needs of the programs at both institutions. The final allocation of space should support attainment of student outcomes and provide an atmosphere conducive to learning. This finding remains a Concern until the program provides adequate classrooms, offices and laboratories to support attainment of the student outcomes.

Due Process Response: A memorandum from the Provost was provided stating that the University expects to reallocate space to the College of Science and Technology upon completion of the Advanced Technology Center in 2015.

Status after Due Process: The Concern remains until adequate space has been allocated to the program to support the attainment of the student outcomes.

RESPONSE: Fairmont State University currently shares space with Pierpont Community & Technical College. Upon completion of Pierpont Community and Technical College new off-site Advanced Technology Center, additional space will become available for the Engineering Technology programs.

The Pierpont C&TC Advanced Technology Center was completed in 2017. Most of the freed space has been reallocated to the Department of Technology.

GENERAL CRITERIA

CRITERION 1. STUDENTS

For the sections below, attach in supplemental information any written policies that apply or provide a link to an appropriate page on the institution's website.

A. Student Admissions

Summarize the requirements and process for accepting new students into the program.

Admission Requirements

Students seeking admission to Fairmont State University must be of the age of compulsory attendance in the state of West Virginia and file an application for admission. Application and supporting credentials must be on file at least two weeks prior to the opening of a semester or term. All credentials submitted in support of an application for admission become the property of the University and will not be returned to the student. Any student admitted upon the basis of false credentials will be subject to immediate dismissal from the University.

The application for admission must specify the student's desired degree or program objective. Admission to Fairmont State University does not guarantee admission to specific programs, which may be restricted due to limitations of staff, physical facilities, and space available for experiential training. The standards and procedures for admission to limited-enrollment programs are presented later in this section.

Students who fail to register during the semester or term for which they have been admitted, must file another application in order to gain admission at a later date.

Fairmont State University Admission Requirements

REQUIRED FORMS AND CREDENTIALS

All students applying for admission to Fairmont State University degree programs are required to complete and submit the following forms and credentials:

1) Application for Admission
2) Official high school transcript sent by high school or high school equivalency diploma (not required for transfer students having a 2.0 grade point average and at least 24 hours of completed coursework)
3) Official ACT or SAT scores (not required for students who graduated high school more than 5 years prior to enrollment term or for transfer students having a 2.0 average and at least 24 hours of completed coursework)
4) Transcript of home-schooled students to include classes taken, credit hours and grades earned, graduation date and signature of the home school provider (may be submitted in lieu of a high school equivalency transcript, however the high school equivalency transcript may be required for financial aid and scholarships)
5) Official college transcripts, if applicable
6) Immunization Records including measles, mumps, & rubella (MMR) (if born after January 1, 1957)
7) Permanent Resident Card, if applicable

BACHELOR'S DEGREE PROGRAMS ADMISSION REQUIREMENTS

Admission to bachelor's degree programs is open to graduates of approved high schools who have a 2.0 high school GPA (or received a high school equivalency transcript) and a minimum composite score of 18 on the ACT or 870 on the SAT (combination of Critical Reading and Math scores if test was taken prior to March 2016) or a 950 SAT (total score on tests taken March 2016 and after). Students with at least a 3.0 high school GPA and SAT or ACT composite test scores will be admitted regardless of the test scores. Applicants must also satisfy the following minimum high school unit requirements.

REQUIRED UNITS (Years)

- 4 English (including English 12CR and courses in grammar, composition, and literature)
- 3 Social Studies (including U.S. studies/history)

- 4 Mathematics (three units must be Algebra I and higher or Math I or higher; Transitional Math for seniors will also be accepted). Courses designed as "support courses", such as Math I Lab or Math I Support, that provide extra instructional time but no additional content shall not be acceptable as meeting the required 4 mathematic course core requirements.
- 3 Science (all courses to be college preparatory laboratory science, preferably including units from biology, chemistry, and physics)
- 1 Arts
- 2 World Language (two units of the same world language; sign language is also acceptable)

Fairmont State University may admit by exception students who do not meet the basic admissions standards.

B. Evaluating Student Performance

Summarize the process by which overall student academic performance is evaluated and student progress towards graduation is monitored. Include information on how the program ensures and documents that students are meeting course prerequisites and how the situation is addressed when a prerequisite has not been met.

ASSESSMENT OF STUDENT ACADEMIC ACHIEVEMENT

Fairmont State University employs a variety of assessment processes to inform students of progress in courses and clinical experience and toward degrees, to analyze programs in order to make appropriate curricular changes, and to determine institutional effectiveness. The university follows policies of the Higher Learning Commission of the North Central Association of Colleges and Schools, the WV Higher Education Policy Commission, policies of specific academic and professional accrediting bodies, and its own governing board.

In addition to regular course examinations and presentations, assessments used include field tests of proficiency in the major; electronic portfolios; capstone projects; internships; clinical practice reviews; and juried performances. Some programs, such as nursing and teacher education, also require nationally normed entrance and exit examinations. All degree programs analyze and review their effectiveness every five years, reporting this information to the WVHEPC and the Fairmont State University Board of Governors. Programs also engage in an annual review process to assess the effectiveness of academic programs and learning experiences. The institution reports its overall progress to the HLC every ten years.

GRADING SYSTEM

The following system of grading is used at FAIRMONT STATE UNIVERSITY:

   A - Superior. Given only to students for exceptional performance
   B - Good. Given for performance distinctly above average in quality
   C - Average. Given for performance of average quality
   D - Lowest passing grade, for performance of poor quality
   F - Failure. Course must be repeated if credit is to be received
   I - Incomplete, a temporary grade given only when students have completed more than 70% of the course but are unable to conclude it because of unavoidable circumstance.
   W - W - Withdrew
   CR - Credit/grade of "C" or higher. Does not affect quality points (see below)
   NC - No Credit. Does not affect quality points
   NCX - No Credit, indicating a significant lack of effort. Does not affect quality points.
   NR - Not Reported. Given when instructor has not submitted grade
   S - Satisfactory. Given for Continuing Education courses only
   U - Unsatisfactory. Given for Continuing Education courses only

QUALITY POINTS

The value of a student's work is indicated by quality points. Candidates for graduation must have at least twice as many quality points as GPA hours; that is, a point-average of 2.0 on all college work.

Quality points for grades A, B, C, D, are computed as follows:
   A - Four (4) quality points for each semester hour of credit
   B - Three (3) quality points for each semester hour of credit
   C - Two (2) quality points for each semester hour of credit
   D - One (1) quality point for each semester hour of credit

Students' grade averages are determined by dividing the number of quality points by the number of GPA hours. No quality points are attached to grades of F, but the GPA hours for the courses in which these grades are received will be used in computing grade averages. In order to graduate, candidates for degrees must maintain a grade point average of 2.0 or better in all college courses and in all credit earned at Fairmont State University. An average of 2.0 must also be maintained in the major and minor fields of study. Students in the teacher education program must attain a grade point average of 2.75 overall, in each teaching field and in professional education. It is the student's responsibility to remain informed of quality point standing. This information can be obtained at any time from the Registrar's Office.

EXAMPLE FOR COMPUTING GRADE-POINT AVERAGE

Courses Taken	Final Grade	Quality Points	Semester Hours	Quality Points (Total)
ENGL 1101	A	4	3	12
BIOL 1101	D	1	4	4
HIST 2211	B	3	3	9
SOCY 1110	C	2	3	6
POLI 1100	B	3	3	9
MATH 1510	W	-	-	-
		13	16	40

40 Quality Points

16 Semester Hours = 2.5 Grade-Point Average

PRE-ENGINEERING CURRICULUM

  Students planning graduate-level work in engineering should complete the following course work with a B average or better. Students are advised to carefully consult the catalog of the engineering school which they plan to attend, as Fairmont State University does not have an articulation agreement with any school of engineering.

- CHEM 1105, 2200 CHEMICAL PRINCIPLES, FOUNDATIONAL BIOCHEMISTRY 9
- ENGL 1101, 1102 WRITTEN ENGLISH I, II 6
- MATH 1540 TRIG. AND ELEMENTARY FUNCTIONS 3
- MATH 2501 CALCULUS I 4
- MECH 1100 STATICS 3
- PHED 1100 FITNESS AND WELLNESS 2
- PHYS 1101, 1102 INTRODUCTION TO PHYSICS I, II 8
- -OR PHYS 1105, 1106 PRINCIPLES OF PHYSICS I, II 8
- SOCIAL SCIENCE ELECTIVE 3
- TECH 1108 ENGINEERING GRAPHICS I 3

C. Transfer Students and Transfer Courses

Summarize the requirements and process for accepting transfer students and transfer credit. Include any state-mandated articulation requirements that impact the program.

TRANSFER STUDENTS

Any applicant for admission to Fairmont State University who has attended another collegiate institution will be classified as a transfer student. Every effort will be made to allow credit earned at other accredited colleges and universities to count towards a degree at Fairmont State University. Transfer students must meet the previously stated admission requirements of Fairmont State University. They must provide evidence of good standing at the institution last attended and must have maintained a minimum 2.0 GPA.

Students transferring fewer than 24 semester hours must provide an official copy of their high school transcript/home school or high school equivalency transcript, official ACT or SAT scores (if the student has graduated from high school less than 5 years prior to the enrollment term) and official college transcript(s).

TRANSFERRING CORE COURSEWORK

According to Series 17, Policy Regarding the Transferability of Credits and Grades at the Undergraduate Level, students who transfer from one state college or university to another may transfer core coursework that will count toward fulfillment of general studies requirements at the receiving institutions.

Under the terms of the agreement, a student may transfer up to thirty-five credit hours of undergraduate coursework in the areas of English composition, communications and literature, fine arts appreciation, mathematics, natural science, and social science as general studies credits. Copies of the agreement are available in the Enrollment Services Center.

The following is a list of General Studies Requirements that may be fulfilled by comparable coursework at another institution. All other General Studies Requirements must be completed at Fairmont State University.

English Composition - 6 hours
ENGL 1101 WRITTEN ENGLISH I 3
ENGL 1102 WRITTEN ENGLISH II... 3

Communication and Literature - 6 hours
COMM 2200 INTRO. TO HUMAN COMMUNICATION 3
ENGL 2220 LITERATURE OF THE WESTERN WORLD I 3

ENGL 2221 LITERATURE OF THE WESTERN WORLD II 3

ENGL 2230 INTRODUCTION TO LITERATURE I 3

ENGL 2231 INTRODUCTION TO LITERATURE II 3

ENGL 3391 THE SHORT STORY 3

Fine Arts Appreciation - 3 hours

ART 1120 ART APPRECIATION 3

INTR 1120 EXPERIENCING THE ARTS 3

MUSI 1120 MUSIC APPRECIATION 3

THEA 1120 THEATRE APPRECIATION 3

Mathematics - 3-4 hours

MATH 1507 or 1407 FUNDAMENTAL CONCEPTS OF MATHEMATICS ….. 3-4

MATH 1530 or 1430 COLLEGE ALGEBRA 3-4

MATH 1540 TRIGONOMETRY AND ELEMENTARY FUNCTIONS 4

MATH 2501 CALCULUS I 4

Natural Science - 8-10 hours

BIOL 1105 BIOLOGICAL PRINCIPLES I 4

BIOL 1106 BIOLOGICAL PRINCIPLES II.. 4

CHEM 1101 GENERAL CHEMISTRY 4

CHEM 1102 GENERAL CHEMISTRY II 4

CHEM 1105 CHEMICAL PRINCIPLES I.......................................5

PHYS 1101 INTRODUCTION TO PHYSICS I 4

PHYS 1102 INTRODUCTION TO PHYSICS II 4

PHYS 1105 PRINCIPLES OF PHYSICS I 4

PHYS 1106 PRINCIPLES OF PHYSICS II 4

GEOL 1101 GENERAL GEOLOGY 4

GEOL 1102 HISTORICAL GEOLOGY 4

Social Science - 9 hours

BSBA 2200 ECONOMICS 3

BSBA 2211 PRINCIPLES OF MACROECONOMICS 3

HIST 1107 U.S. HISTORY I 3

HIST 1108 U.S. HISTORY II 3

HIST 2211 HISTORY OF CIVILIZATION I................................3

HIST 2212 HISTORY OF CIVILIZATION II 3

HIST 2213 HISTORY OF CIVILIZATION III 3
POLI 1103 AMERICAN GOVERNMENT 3
POLI 2200 INTRODUCTION TO POLITICAL SCIENCE 3
PSYC 1101 INTRODUCTION TO PSYCHOLOGY 3
SOCY 1110 INTRODUCTION TO SOCIOLOGY 3

CREDIT FROM A JUNIOR OR COMMUNITY COLLEGE

The maximum credit accepted from a Junior or Community College accredited by the North Central Association of Colleges and Schools or other regional accrediting association will not exceed 72 semester hours.

D. Advising and Career Guidance

Summarize the process for advising and providing career guidance to students. Include information on how often students are advised, who provides the advising (program faculty, departmental, college or university advisor).

ACADEMIC ADVISING SYSTEM

Students are assigned academic advisors when they first enroll at Fairmont State University. The advisor is a faculty member in the respective major. Those students who are not ready to select a major upon entrance will be assigned to the Office of Exploratory Advising. Students wanting to change their major fields of study must contact the Registrar's Office; students will then be referred to their major departments to have a new advisor assigned.

Students should discuss problems relating to degree requirements, registration, and withdrawals from class or college with their advisors. Students are assigned a PIN number for registration each semester and must meet with their assigned advisor to discuss academic progress and scheduling. Once a schedule is established, students obtain their PIN numbers and may register for courses.

Faculty advising consists of academic and career planning. Students meet with their faculty advisors every semester until graduation. During the advising sessions, students are advised regarding course schedules, internships and career goals. Advisors will encourage elective and special topic courses that may enhance an individual students' goals.

All students in the Electronic Engineering Technology program have internship opportunities beginning in the sophomore/junior summer. Students are advised to choose opportunities that interest them and vary their experiences each summer with a different company or type of work environment. Beginning in the senior year, students are encouraged to apply for graduation and begin their career search. Outside of advising, students in the EET program are presented with many employment opportunities- local, regional and national. In the academic year 2018-2019, a variety of employers came to campus and gave students a chance to apply and interview. Students benefit from the opportunity to interview and potentially gain employment.

E. Work in Lieu of Courses

Summarize the requirements and process for awarding credit for work in lieu of courses. This could include such things as life experience, Advanced Placement, dual enrollment, test out, military experience, etc.

ADVANCED PLACEMENT EXAMINATION (AP)

Fairmont State University recognizes certain examinations of the College Board Advanced Placement Program. Students who participate in the AP program and wish to have their scores evaluated for credit should have their scores sent to Fairmont State University. The AP examinations are prepared by the College Board, and the papers are graded by readers of the Educational Testing Service, Princeton, NJ 08540. Students cannot receive credit for a score below 3 on any exam.

Students who do receive credit will be assigned the grade of CR, which is not calculated into the GPA. Students will not be awarded multiple credit, standing or GPA based on duplicated advanced placement scores, tests or transfer work.

COLLEGE LEVEL EXAMINATION PROGRAM (CLEP)

The College Level Examination Program (CLEP) provides students with the opportunity to demonstrate college-level achievement through a program of exams in undergraduate college courses. Students can reduce their costs in time and money by successfully completing CLEP tests for credit. The CLEP exams are prepared by the College Board and administered by Pierpont Community & Technical College. Students must achieve a minimum score of 50 to receive college credit. For additional information, contact the Center for Workforce Education at (304) 368-7254 or (304) 367-4920.

Students will not be awarded multiple credit, standing or GPA based on duplicated advanced placement scores, tests or transfer work.

EQUIVALENT CREDIT

A unique feature of the RBA Degree Program is the possibility of obtaining college-equivalent credit for demonstrated college-level knowledge that has been learned in environments and agencies outside the classroom. To earn credit, students must demonstrate knowledge of learning objectives and outcomes equivalent to specific courses taught at Fairmont State or within the West Virginia State System of Higher Education. Students who have obtained any professional, state, or national licenses or certifications can request a review of the credentials to determine if they are eligible to receive college credit.

Portfolio evaluations are completed for enrolled students by faculty members who teach the course for which credit is sought. Portfolios should be submitted prior to semester midterm to ensure that sufficient time is available for evaluation. The fee for portfolio evaluation is $300 regardless of whether or not credit is awarded. If credit is recommended, then the faculty members will also recommend the number of credit hours to be awarded along with the appropriate level (upper or lower). An additional $10 per credit hour processing fee is required to transcript the credit.

Credit earned via portfolio or prior learning assessment does not count toward meeting the state or institutional residency requirements for the RBA program. Awarded credit hours will not be posted to a student's academic transcript until after residency requirements have been met.

Academic credit will only be awarded to students who are admitted to and currently enrolled in the RBA Degree Program. Students, however, cannot be awarded college - Equivalent credit during their first or final semesters in the RBA program.

F. Graduation Requirements

Summarize the graduation requirements for the program and the process for ensuring and documenting that each graduate completes all graduation requirements for the program. State the name of the degree awarded (e.g., Bachelor of Science in Electronics Engineering Technology, and Associate of Science in Electronics Engineering.)

DEGREE REQUIREMENTS

To qualify for graduation, candidates must accumulate a total of 120 semester hours of credit with a minimum quality point average of 2.00. At least 39 hours must be at the upper (3300 or 4400) level. Students must complete 36 semester hours of General Studies courses, including the required semester hours in each of the following areas: Communications (6), Social Sciences (6), Natural Sciences (6), Mathematics or Computer Applications (3), Humanities (6), and 9 additional General Studies hours. At least 24 semester hours must be taken in the West Virginia State System of Higher Education and at least 12 of those credit hours must be completed at Fairmont State.

Students are required to apply for graduation. This process takes place the semester before the anticipated graduation. The students are audited for degree compliance and receive a graduation audit form outlining any remaining degree requirements. The degree audit ensure the student is aware of any remaining requirements and can register for the appropriate courses.

G. Transcripts of Recent Graduates

The program must provide transcripts from recent graduates to the visiting team along with any needed explanation of how the transcripts are to be interpreted. **These transcripts will be requested separately by the Team Chair.** State how the program and any program options are designated on the transcript. (See 2019-2020 APPM, Section I.E.3.a.)

The degree is designated as a Bachelor of Science in Engineering Technology. No options currently exist in the program. Minors, concentrations, and or specializations may be obtained, but are not options in the program. Examples may be a minor in occupational safety or business.

CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES

A. Mission Statement

Provide the institutional mission statement.

MISSION STATEMENT

The Fairmont State University family educates, enriches, and engages students to achieve personal and professional success.

VISION STATEMENT

Fairmont State University aspires to be nationally recognized as a model for accessible learner centered institutions that promote student success by providing comprehensive education and excellent teaching, flexible learning environments, and superior services. Graduates will have the knowledge, skills, and habits of mind necessary for intellectual growth, full and participatory citizenship, employability, and entrepreneurship in a changing environment.

B. Program Educational Objectives

List the program educational objectives and state where these can be found by the general public. *This is typically an easy to find web page clearly linked to the program's website.*

The Program Educational Objectives have changed during this accreditation cycle. The following were the PEO's until November of 2018:

Program Objectives

The Program Objectives, as determined by the Electronics Engineering Technology Program's constituencies, are intended to promote professional competencies and continued professional growth. Students and graduates shall, to varying degrees, be competent in:

1. Applying academic competencies and methodologies in addressing and solving problems as a professional.
2. Using learned technical and non-technical methodologies to communicate to audiences of varying demographics.
3. Ethically and respectfully performing professional responsibilities as part of a team and or multidisciplinary team.
4. Recognizing and assessing the societal and global impact of professional decisions and practices.
5. Pursuing lifelong learning through professional development.

During the Fall 2018 semester the PEO's were changed to match industry need and also the newly adopted ABET 1-5 Student Outcomes. The current Program Educational Objectives for the Electronics Engineering Technology Program are as follows:

1) Relate the concepts of self-directed lifelong learning and the ability to undertake further study and/or examinations specific to the discipline through demonstration of technical skills as a practicing professional, applying knowledge and discipline specific tools.
2) Evaluate results and develop professional documents relevant to the discipline and to communicate such findings to a technical and non-technical audience.
3) Operate effectively in a diverse, multi-disciplinary environment demonstrating skills in leadership, professionalism and teamwork.

https://www.fairmontstate.edu/collegeofscitech/academics/electronics-engineering-technology-outcomes

C. Consistency of the Program Educational Objectives with the Mission of the Institution

Describe how the program educational objectives are consistent with the mission of the institution. A table illustrating how educational objectives support the elements of the institutional mission can be used, in addition to a brief explanation.

The university's mission and the Electronics Engineering Technology Program Educational Objectives promote the growth and realization of professional and personal development along with the desire for responsible citizenship of graduates. The mission emphasizes providing opportunities for students to achieve their professional and personal goals. The PEO's align with these goals. Through achieving academic competencies, enhancing communication abilities, a desire to pursue life-long learning opportunities and obtaining skills in working in teams, students are afforded the opportunity to attain a level of professional and personal growth that will increase their marketability and societal awareness thereby enriching their degreed field.

Students' personal goals of achieving a college degree that leads to employment in their degreed field supports the university's mission of providing opportunities for personal growth. Since academic competencies can be both intrinsically and extrinsically rewarding, all PEO's can map to personal goals as well.

Lastly, the Electronics Engineering Technology program promotes the exploration of the impact of professional decisions and inherent responsibilities of professionals through promoting ethical practices. This speaks directly to the university's mission of responsible citizenship. The program also promotes students to earn Professional Development Credits in an effort to teach the importance of professional development as well as community outreach.

Program Objectives, Goals, and Competencies			
Program Objectives *Graduates and students of the Electronics Engineering Technology program shall be competent to achieve at the time of graduation and during the first few years following graduation, the following:*	The Fairmont State University family educates, enriches, and engages students to achieve personal and professional success.		
	Professional goals	*Personal goals*	*Responsible citizenship*
1. Relate the concepts of self-directed lifelong learning and the ability to undertake further study and/or examinations specific to the discipline through demonstration of technical skills as a practicing professional, applying knowledge and discipline specific tools.	X	X	X
2. Evaluate results and develop professional documents relevant to the discipline and to communicate such findings to a technical and non-technical audience.	X	X	
3. Operate effectively in a diverse, multi-disciplinary environment demonstrating skills in leadership, professionalism and teamwork.	X	X	X

Table 2-1

In summary, Table 2-1 maps the Program Objectives to the university's mission. The mapping is subject to change depending on the students' personal and professional goals.

D. Program Constituencies

List the key program constituencies involved in the review of the program educational objectives. Describe how the program educational objectives meet the needs of these constituencies.

Faculty: Faculty are responsible for successfully teaching the material in the courses, developing the curriculum, student advising and institutional committees. The curriculum is designed to meet the student outcomes and Program Educational Objectives (PEO's). Full time faculty are an integral part of the PEO review process. Part time faculty provide input during meetings or through evaluations.

Alumni: As former students, the success of alumni reflects the achievement of the PEO's. Alumni are asked to provide input on the relevance and achievement of PEO's. Alumni are part of our annual meetings and provide feedback during those events.

Employers: Employers may be academic, industry, government or private entities. Employers provide feedback on recent graduates and achievement of PEO's. Their feedback is typically given at annual meetings and career fairs.

Engineering Advisory Board: This group meets annually at minimum. They are comprised of all constituents plus project managers and team leaders from regional and national employers. They share current practice and experience and help shape the PEO's.

Each of the constituents are a part of the educational process in the Electronics Engineering Technology program. The faculty have the responsibility for curriculum and education of the students. The program curriculum and program are the main component of accomplishing the PEO's. The alumni are the results of the program and represent accomplishment of the PEO's. They also have advisory roles in both curriculum and program needs. The employers seek well prepared graduates who can accomplish the PEO's. Employers advise the program to ensure success. The advisory board is comprised of all the constituents and other industry leaders who periodically review the PEO's and modify them to meet the needs of all constituents.

E. Process for Review of the Program Educational Objectives

Describe the process that periodically reviews the program educational objectives including how the program's key constituencies are involved in this process. Describe how this process is systematically utilized to ensure that the program's educational objectives remain consistent with the institutional mission, the program constituents' needs and these criteria.
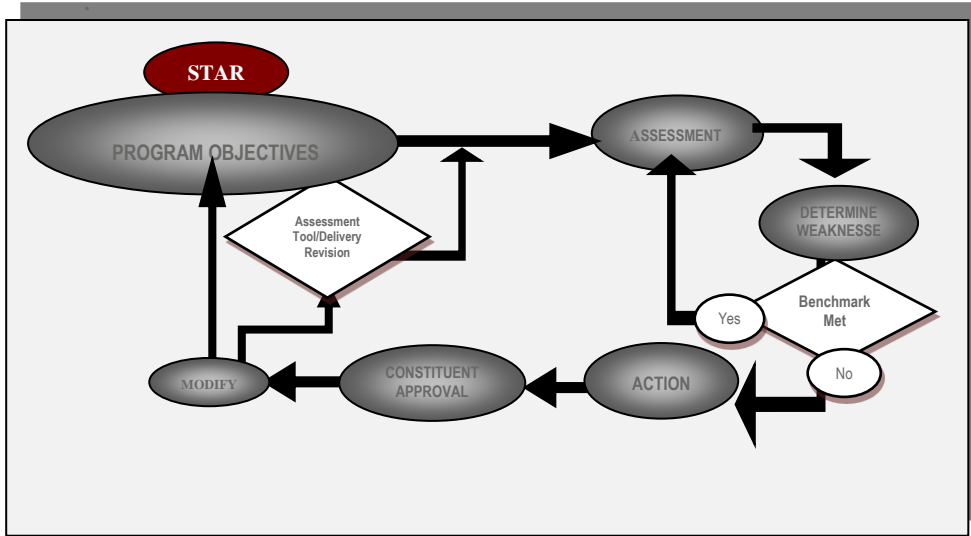
Review of Program Educational Objectives:

Program Educational Objectives are reviewed annually at the Industrial Advisory Committee meeting. The PEO's are displayed annually and reviewed by all constituents. The PEO's were to be updated in the Fall of 2017, however, the impending change to ABET Outcomes caused a delay in the implementation of the new PEO's as faculty wanted to ensure alignment between PEO's and SO's.

The meeting minutes capture any discussion of PEO's. The minutes are reviewed by faculty and program coordinators. The overall continuous improvement (CI) forms document the changes to PEO's. Display materials documenting PEO revision will include:

1) Industrial Advisory Committee (IAC) meeting minutes
2) Continuous Improvement plan form

Program Educational Objectives were approved for change in November of 2018. The PEO's will be reviewed at the next annual IAC meeting. Below is a description of the overall continuous improvement process with relation to PEO's:

CRITERION 3. STUDENT OUTCOMES

A. Process for the Establishment and Revision of the Student Outcomes

Describe the process used for establishing, reviewing, and revising student outcomes.

The Electronics Engineering Technology program has adopted ABET outcomes 1-5. The adoption of those outcomes was approved by the Electronics Industrial Advisory Committee that met in November 2018. The review and revision of outcomes will occur when program educational objectives are reviewed annually. PEO's and SO's are reviewed as part of the annual Industrial Advisory Committee meetings. Prior to November 2018, the program had six outcomes linked to ABET student outcomes. A mapping of the former outcomes will be provided in the following sections.

B. Student Outcomes

List the student outcomes for the program. Indicate where the student outcomes are documented and made accessible to the public. *This is typically an easy to find web page clearly linked to the program's website but could also be in a student handbook.*

The Electronics Engineering Technology program adopted ABET outcomes 1-5 as program outcomes. The student outcomes were changed by the program in November 2018. Prior to November 2018 the student outcomes were ABET "a-k" plus the discipline specific outcomes for the program. The student outcomes can be found on the programs web page: https://www.fairmontstate.edu/collegeofscitech/academics/electronics-engineering-technology-outcomes

The current student outcomes are as follows:

1. An ability to apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, or technology to solve broadly-defined engineering problems.

2. An ability to design solutions for well-defined technical problems and assist with engineering design of systems, components, or processes appropriate to the discipline.

3. An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature.

4. An ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments.

5. An ability to function effectively as a member of a technical team.

For reference purposes, the Student Outcomes prior to November 2018 were as follows:

1. Students will master and apply current knowledge, techniques, skills, and modern tools of their disciplines including mathematics and science.
2. Students will identify, analyze, and improve technical processes including experimental verification.
3. Students will apply creativity in the design of systems, components, or processes appropriate to program objectives including working on teams and communicating effectively.
4. Students will prepare for the ability to engage in lifelong learning, a commitment to quality, timeliness, and continuous improvement.
5. Students will demonstrate an awareness of professional, ethical, and social responsibilities, including a respect for diversity and a knowledge of contemporary professional, societal and global issues.
6. Students will solve complex problems utilizing discipline specific expertise.

Mapping of these outcomes is shown in the following tables. These have been replaced by the new ABET 1-5 SO's adopted by the program.

Program Outcomes as Relating to ABET a-k and Program Specific Criteria
The Electronics ET program has recoded the program specific outcomes mandated by ABET. The coding used by the program is shown below.

ABET Code	Outcome	ELEC ET Code
a	an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities	a
b	an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies	b
c	an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes	c
d	an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives	d
e	an ability to function effectively as a member or leader on a technical team	e
f	an ability to identify, analyze, and solve broadly-defined engineering technology problems	f
g	an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature	g
h	an understanding of the need for and an ability to engage in self-directed continuing professional development	h
i	an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity	i
j	a knowledge of the impact of engineering technology solutions in a societal and global context	j
k	a commitment to quality, timeliness, and continuous improvement	k

a.	the ability to analyze, design, and implement control systems, instrumentation systems, communications systems, computer systems, or power systems.	l
c.	the ability to apply project management techniques to electrical/electronic(s) systems.	m
b.	the ability to utilize statistics/probability, transform methods, discrete mathematics, or applied differential equations in support of electrical/electronic(s) systems.	n

Table 3-1 maps ABET's a-k and the program criteria as required in criterion 3 to the Electronics Engineering Technology Program's Student Outcomes.

Program Student Outcomes	General Criteria													
	a	b	c	d	e	f	g	h	I	j	k	l	m	n
1. Students will master and apply current knowledge, techniques, skills, and modern tools of their disciplines including mathematics and science.	X	X													
2. Students will identify, analyze, and improve technical processes including experimental verification.			X			X									
3. Students will apply creativity in the design of systems, components, or processes appropriate to program objectives including working on teams and communicating effectively.				X	X		X								
4. Students will prepare for the ability to engage in lifelong learning, a commitment to quality, timeliness, and continuous improvement.								X			X				
5. Students will demonstrate an awareness of professional, ethical, and social responsibilities, including a respect for diversity and a knowledge of contemporary professional, societal and global issues.									X	X					
6. Students will solve complex problems utilizing discipline specific expertise.												X	X	X	

Table 3-1

C. Mapping of Student Outcomes to Criterion 3 Student Outcomes

Describe if the student outcomes used by the program are stated differently than the requirements listed in Criterion 3. If so, provide the mapping of the program's student outcomes to the Criterion 3 requirements one through five.

The Electronics Engineering Technology program adopted ABET outcomes 1-5 as the program student outcomes. New performance indicators are used to define program needs within the outcomes. These are newly defined and implemented. Figure 3-1 shows the mapping from the "a-k" outcomes to the new 1-5 outcomes.

Criteria 3 – Existing Format

a. an ability to apply the knowledge, techniques, skills, and modern tools of the discipline to broadly defined engineering technology activities;

b. an ability to apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;

c. an ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;

d. an ability to design systems, components, or processes for broadly– defined engineering technology problems appropriate to program educational objectives:

e. an ability to function effectively as a member of a technical team;

f. an ability to identify, analyze, and solve broadly defined engineering technology problems;

g. an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;

h. an understanding of the need for an ability to engage in self directed continuing professional development;

i. an understanding of and a commitment to address professional and ethical responsibilities, including a respect for diversity;

j. a knowledge of the impact of engineering technology solutions in a societal and global context; and

k. a commitment to quality, timeliness, and continuous improvement.

Criteria 3 – New Format

1) an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems;

2) an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to the discipline;

3) an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature

4) an ability to conduct standard tests and measurements, and to conduct, analyze and interpret experiments;

5) an ability to function effectively as a member of a technical team;

Criterion 5. Curriculum

Figure 3-1

D. Relationship of Student Outcomes to Program Educational Objectives

Describe how the program's student outcomes prepare graduates to attain the program's educational objectives.

It is helpful if the self-study questionnaire provides a mapping, using the table below, of the Program Educational Objectives, Student Outcomes, the ABET (1) – (5) student outcomes and the program courses that support the program student outcomes (courses where the students learn or develop competencies related to the student outcomes).

Program Educational Objective	*ABET (1)-(5)*	*Program Courses Supporting the Program Outcome*
POE 1: Relate the concepts of self-directed lifelong learning and the ability to undertake further study and/or examinations specific to the discipline through demonstration of technical skills as a practicing professional, applying knowledge and discipline specific tools.	Outcome 1	ELEC 1100 Circuit Analysis I ELEC 2225 Electronic Devices ELEC 2210 Circuit Analysis II ELEC 2230 Digital Electronics ELEC 2240 Industrial Electronics ELEC 2250 AC/DC Mach and CTL ELEC 2270 Intro to Microcontroller Sys ELEC 2280 Programmable Controllers ELEC 3300 Adv Linear Electronics ELEC 3360 Elect. Communication Sys ELEC 4401 Senior Elec Proj 1 ELEC 4402 Senior Elec Proj 2 ELEC 4410 Data Acqn and Cntrl Sys ELEC 4420 Adv. Automation CTL Sys
	Outcome 2	ELEC 2210 Circuit Analysis II ELEC 2230 Digital Electronics ELEC 2270 Intro to Microcontroller Sys ELEC 3300 Adv Linear Electronics ELEC 3310 Adv Microcontroller Sys ELEC 4401 Senior Elec Proj 1 ELEC 4402 Senior Elec Proj 2 ELEC 4410 Data Acqn and Cntrl Sys ELEC 4420 Adv. Automation CTL Sys
POE 2: Evaluate results and develop professional documents relevant to the discipline and to communicate such findings to a	Outcome 3	ELEC 2210 Circuit Analysis II ELEC 2240 Industrial Electronics ELEC 2270 Intro to Microcontroller Sys ELEC 3300 Adv Linear Electronics ELEC 4402 Senior Elec Proj 2

technical and non-technical audience.		
	Outcome 4	ELEC 1120 AC/DC Electronics Analys. ELEC 2225 Electronic Devices ELEC 2240 Industrial Electronics ELEC 2250 AC/DC Mach and CTL ELEC 2280 Programmable Controllers ELEC 3300 Adv Linear Electronics ELEC 3360 Elect. Communication Sys ELEC 4410 Data Acqn and Cntrl Sys
POE 2: Operate effectively in a diverse, multi-disciplinary environment demonstrating skills in leadership, professionalism and teamwork.	Outcome 5	ELEC 2225 Electronic Devices ELEC 2240 Industrial Electronics ELEC 2250 AC/DC Mach and CTL ELEC 2280 Programmable Controllers ELEC 3300 Adv Linear Electronics ELEC 4420 Adv Automation Concepts

Table 3-2

CRITERION 4. CONTINUOUS IMPROVEMENT

This section of your Self-Study Report should summarize your processes for regularly assessing and evaluating the extent to which the student outcomes are being attained and for using those results for continuous improvement of the program.

Assessment is defined as one or more processes that identify, collect, and prepare the data necessary for evaluation. Evaluation is defined as one or more processes for interpreting the data acquired though the assessment processes in order to determine how well the student outcomes are being attained.

Although the program can report its processes as it chooses, the following is presented as a guide to help you organize your Self-Study Report and present your documentation.

A. Documentation of Processes or Plan

Provide a reference to the plan (documentation of processes in the appendices or in electronic form) used to assess student outcome attainment for the purpose of continuous program improvement. In the sections below, briefly summarize key elements of that process (tabular presentation, where appropriate, is encouraged).

Provide the written plan/graphical representation of the assessment plan clearly identifying who will do what when. If different student outcomes will be assessed in different years, provide an overview of this via a simple table (student outcome versus year of assessment).

ETAC recommends the use of a table (one table per outcome) that captures much of what is requested below (see sample table below). Once data and the other boxes are completed, the table will grow to be several pages.

Overview

The Department of Technology has developed and implemented a Continuous Improvement Plan (CIP) for all ABET accredited programs. The department faculty, in conjunction with the Industrial Advisory Committees (IAC) for Electronics ET, Civil ET, Mechanical ET, and Occupational Safety, collaborated to create a plan that is broad enough to encompass all programs but flexible enough to meet the needs of the individual programs. This joint effort has resulted in a diverse initiative. Annual IAC and regular ABET meetings allow for discussion of continuous improvement from differing perspectives. This allows for sharing of ideas and viewpoints that would otherwise not be expressed or shared. This is especially beneficial to academic programs with few faculty members.

The following is a synopsis of the CIP. The CIP is scheduled for review and possible revision the Fall 2019 semester.

Terminology

The ANSAC and ETAC of ABET accredited programs at FSU use the following terms in its Continuous Improvement Plan and in meetings when discussing continuous improvement:

- **Assessment Points:** The intersection of the course and Student Outcome on the matrix denoted by ABET's legacy outcomes. Mapping to the new ABET 1-5 outcomes was shown in criteria 3.
- **Assessment Tools**: Materials used to gather information for assessment purposes. Assessment tools are specific to the Program Outcomes 1-5. Examples include but are not limited to:
  - Exam questions,
  - Projects,
  - Quizzes,
  - Interviews,
  - Pre and Post exams,
  - Labs,
  - Other.
- **Assessment**: Process of gathering/utilizing assessment tool, and evaluation of assessment tools.
- **Determination of Weakness:** Evaluation of the assessed data in comparison to established benchmark.
- **Actionable Item:** Outcome falling below established benchmark.
- **Action:** Steps proposed for the elimination or control of the weakness.
- **Constituent Approval:** When necessary, the constituencies will be consulted on the intended action.
- **Continuous Improvement Plan:** A comprehensive plan developed and approved by the faculty and IACs used to evaluate outcomes against established benchmarks.
- **Modification:** Change to the Program Outcomes or elements relating to the outcomes.
- **Program Outcomes:** 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.

CIP Flowchart

    Assessment of Program Outcomes is systematically conducted following the procedure specified in the CIP. This flowchart depicts the steps taken to gather and assess materials and modify either delivery or outcomes when established benchmark is not achieved.
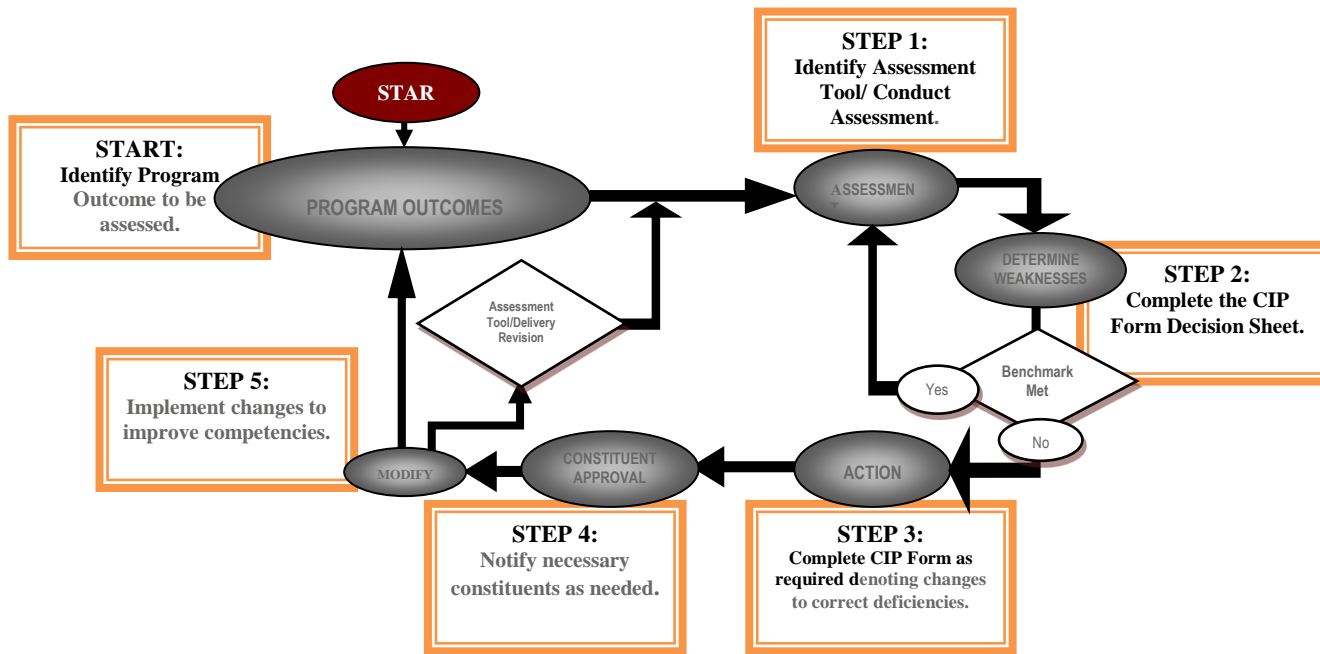
Start: Identify Program Outcome to be Assessed

    The matrix in Figure 4-2 was developed by the program faculty and approved by the IAC.   As seen in the legacy matrix, the model schedule maps to Program Outcomes indicating which of ABET's outcomes is to be assessed.

Year/Semester	Course	1(a,e)	2(b,c,k)	3(d,f)	4(i,g,h)	5(j)	6(l,m,n)
Freshman First Semester 12 hrs	ENGL 1101						
	MATH 1520						
	ELEC 1100	X					
	ELEC 1120	X	X	X			
Freshman Second Semester 15 hrs.	ENGL 1102						
	MATH 1520						
	COMP 1101						
	ELEC 2210	X	X	X			
	ELEC 2225			X			
Sophomore First Semester 16 hrs.	PHYS 1101		X		X		
	TECH 2290						
	G.S. Cat. 10						
	ELEC 2230			X			
	ELEC 2250						
Sophomore Second Semester 17 hrs	PHYS 1102		X		X		
	TECH 3300						
	COMM 2202						
	ELEC 2240				X	X	X
	ELEC 2280				X	X	X
Year/Semester	Course	1(a,e)	2(b,c,k)	3(d,f)	4(i,g,h)	5(j)	6(l,m,n)
Junior First Semester 15 hrs.	Tech Elective						
	G.S. Cat. 9						
	G.S. Cat. 12						
	ELEC 2270	A(a)	X		X	X	
	ELEC 3360		A(b)				A(l)
Junior Second Semester 16 hrs	CHEM 1101						
	G.S. Cat. 6						
	G.S. Cat. 16						
	ELEC 3300	X	A(c)		A(i)		X
	ELEC 3310					A(j)	X
Senior First Semester 13 hrs.	G.S. Cat. 14						
	Tech Elective						
	ELEC 4410		A(k)	A(d)			A(n)
	ELEC 4420	A(e)		X	X		X
Senior Second Semester 16 hrs.	G.S. Cat. 11						
	G.S. Cat. 8,13						
	Tech Elective						
	ELEC 4401			A(f)			A(m)
	ELEC 4402				A(g,h)		

*Curriculum Revised Fall 2016 as Part of CIP	Cycle 1	Cycle 2	Cycle 3
	2013-2014	2014-2015	2015-2016
	*2016-2017	2017-2018	2018-2019

Figure 4-2

Understanding the Matrix

As explanation to the coding of the matrix, Figure 3 clarifies the meaning of the notations. The left column contains the academic courses. The "x" indicates courses in which students should attain academic competencies related to that Program Outcome. The "A" indicates the course in which that competency is assessed. Lastly, the parenthetical notation specifies which ABET outcome is being assessed.

	Program Outcomes					
	1 (a,e)	2 (b,c,k)	3 (h,l,j)	4 (f)	5 (d,g)	6 Program Specific
MATH 1101	X			X		
TECH XXXX	A (a)			A (f)		

Assessment Point

Figure 3

Competency Delivered

ABET a

Competency Assessed
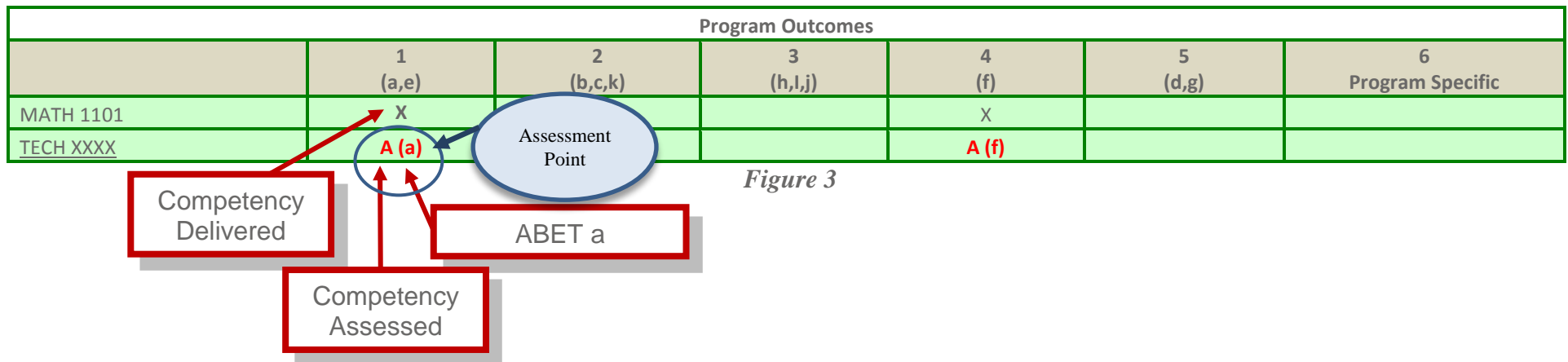
STEP 1: Identify Assessment Tool/ Conduct Assessment

For each assessment point on the matrix, there is an assessment tool developed and managed by the course professor. This tool may be an exam question, project, report, or quiz. The tool used may not be identical each time administered but is similar in content and depth of knowledge.

An example of an assessment tool is:

ELEC 2270
        a.   an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering
              technology activities; maintenance of electrical/electronic(s) systems;

Develop an instructor approved project using a microcontroller, integrating new concepts learned and incorporating ideas learned from previous electronic courses. Each student must be able to communicate effectively the object of the project verbally to the class and a demonstration. A detailed report is required that communicates how the project was accomplished. The report will include a complete schematic, bill of material, calculations, references, data sheets, software code, and a conclusion. Requirements for the contents of the report will be provided by the instructor.

Scoring for each area (0-100%) and averaged for final score:
1. Student follows report contents communicated by the instructor
2. Student initiated procedures that follows best engineering practices
3. Student demonstrates the ability to utilize schematic capture techniques and incorporate engineering graphics into a document
4. Student demonstrates the ability to solve broadly-defined engineering problems
5. Student demonstrates an understanding of how to use lab equipment
6. Students understands what formulae to use and how to apply them properly
7. Lab results are compatible with known engineering truths

*Used for assessment (or similar project, exam, lab or HW assignment)
Once the assessment is conducted, the work is graded/evaluated by the course professor. This may be as simple as the work being correct or incorrect or it may require the use of a grading rubric developed for the assignment.

STEP 2: Complete the CIP Decision Sheet

Once the student work is evaluated, the professor completes a CIP Decision Sheet. This form (Form 4-1), tracks the success of the assessment point in comparison to the established benchmark. If the benchmark is met or exceeded, this form is filed away, and the assessment point is collected and assessed again when required by the assessment cycle.

![CI Form logo] **CI Form** **Continuous Improvement**	**2** Outcome Number	**C** ABET outcome	ELEC 3300 Course Number

Program Name:	☐ AS ☐ BS Civil ET	☐ AS ☐ BS Mechanical ET
	☐ AS ☐ BS Electronics ET	☐ BS Occupational Safety

Date:	8/9/2018	Form Completed By: Tom McLaughlin

1. Assessment Tool Example/Description (ie: exam, project description, homework problem)
Each student will develop a report that discusses the design of an Astable Circuit Using the 555 Integrated Circuit. The report must include the objective, calculations, the schematic, signal measurements, and data analysis. Requirements for the contents of the report will be provided by the instructor. This will satisfy c

2. Established Benchmark: The student average should be ≥ 70%

3. Assessment

☐ AC 1 ☑ AC 2 ☐ AC 3 Choose Semester/Year	Spring/2018 Choose Semester/Year	Spring/2017 Choose Semester/Year
Data Summary	Data Summary	Data Summary 83% average

Aggrate Data (using the data collected for three years, record the percentage of students achieving or exceeding the established benchmark)

Benchmark Met	◉ Yes (action not required)	
	○ No (action required - continue to Section 4)	

4. Description of Weakness:

5. Description of Proposed Actions:

6. Implementation Plan:	
Implementation Steps:	Implementation Date

Form 4-1

The course professor establishes the benchmark for that assessment point in their course. All assessed materials are measured against the benchmark system established in Figure 4-4. The targeted benchmark indicates that 70% of the students have met or exceeded the desired score or grade established by the assignment. Note that the benchmark has been approved by the IAC.

Figure 4-4

Assessment and Benchmarking

Once the assessment tool is completed by the students, the collected work is evaluated by the course professor. All assessed materials are measured against the benchmark system established in Figure 4. The targeted benchmark indicates that 70% of the students have met or exceeded 70% of the desired score or grade established by the assignment. Note that the benchmark has been approved by the IAC.

STEP 3: Complete CIP Form as Required Denoting Changes to Correct Deficiencies

When the benchmark is not met, this is considered substandard and actionable. The professor must complete a CIP Form (shown below, Form 4-2). This form requires the professor to identify and note the weaknesses, offer strategies for modifications (this can be related to material delivery, development, etc…), and share information or seek counsel of constituencies.

CI Form Continuous Improvement	1	a	ELEC 2230 Course Number
	Outcome Number	ABET outcome	

Program Name:	☐ AS ☐ BS Civil ET	☐ AS ☐ BS Mechanical ET
	◉ AS ☐ BS Electronics ET	☐ BS Occupational Safety

Date:	1/18/2018	Form Completed By: Tom McLaughlin

1. Assessment Tool Example/Description (ie: exam, project description, homework problem)

Each student will be responsible for a detailed lab report to develop a circuit using Karnaugh mapping and Boolean algebra and realizing the circuit on a bread-board. Requirements for the contents of the report will be provided by the instructor.

2. Established Benchmark: The student average should be ≥ 70%

3. Assessment

☒ AC 1 ☐ AC 2 ☐ AC 3 Choose Semester/Year	Choose Semester/Year	Fall/2017 Choose Semester/Year
Data Summary	Data Summary	Data Summary 67% average

Aggrate Data (using the data collected for three years, record the percentage of students achieving or exceeding the established benchmark)

Benchmark Met	☐ Yes (action not required)
	◉ No (action required - continue to Section 4)

4. Description of Weakness:

The report developed by many of the students didn't follow the directions properly.

5. Description of Proposed Actions:

The directions will be communicated more effectively the content of the lab and how the grading will be accomplished.	
6. Implementation Plan:	
Implementation Steps:	Implementation Date
Pass out the criteria for the report and communicate the average report grade for the last class was below 70%.	1/18/2018

Form 4-2

STEP 4: Notify Necessary Constituents as Needed

Constituencies may need to be notified of weaknesses as well as proposed changes. The IAC is briefed annually on the weaknesses identified in the collection and processing of Program Outcomes. Students, as constituents, are often notified of substandard performance when reviewing the material or if the assessment tool is deemed flawed in some way. Other program faculty members may be notified of findings if a change in delivery methodology is proposed or if the course faculty wants to move the assessment point.

The decision to present this information to the IAC is discussed during the Collaborative Report meeting. This is a meeting of program faculty conducted the first week of every semester to discuss the findings from the previous semester. These meetings produce reports that are filed in the ABET room, and reviewed with the IAC at the annual November meetings.

STEP 5: Implement Changes to Improve Competencies

The last step in the CIP is to implement changes by either changing pedagogy, or the outcome itself. At no point has a Program Outcome been changed. However, it is common to change the assessment tool, delivery methodology, or location (course) of the assessment. When weaknesses are identified, it is common for faculty to develop a new or revised assessment tool, attach it to the CIP and administer it during the next applicable cycle.

Assessment Cycle

As cited on the bottom row of the matrix and summarized in Figure 4-5, below, the assessment frequency is a three year cycle.

- Year 1: Assess Outcomes 1 and 2
- Year 2: Assess Outcomes 3, 4, and 5
- Year 3: Assess Outcome 6

Program Outcomes						
Electronics Engineering Technology						
Course	1(a,e)	2 (b,c,k)	3 (d,f)	4(i,g.h)	5 (j)	6(l,m,n)
	ASSESSMENT CYCLE ONE (AC1)		**ASSESSMENT CYCLE TWO (AC2)**			**ASSESSMENT CYCLE THREE (AC3)**

Figure 4-5

Maintenance and Management of Documents

All CIP documentation is maintained in a file system in the ABET room. Faculty are encouraged to utilize TaskStream to electronically file and manage the documents as well. The faculty are responsible for completing and filing all forms in order to track assessment results and required corrective measures.

Collaborative Report

As previously mentioned, program faculty meet during the first week of every semester to discuss actionable items from the previous semester's assessment points. These meetings allow for discussion and collaboration on corrective actions to substandard student performance. The reports are filed with the program coordinator and the ABET coordinator for future reference.

Continuous Improvement Plan – Collaborative Review

Civil Engineering Technology Program
Faculty Collaborative Review
Fall 2017

Scope:

The Civil Engineering Technology Faculty, Gary Zickefoose, Tia Como and James Vassil, met January 2018 to review the Continuous Improvement Plans (CIP) established for all assessment points that did not meet benchmark during Fall Semester 2017. During **Assessment Cycle 2 – Fall Semester** the following points were assessed:

Assessment Cycle 2 – Fall 2017

Course	Assessment Point
CIVL 2210	4h, 5i
CIVL 2220	3e,3f
CIVL 2275	3d,3g
CIVL 3305	3d
CIVL 4410	3d
CIVL 4460	5j
CIVL 4470	4k

Highlighted =
Actionable Points

Findings:

At this time, based upon the data collected, 70% of the course students met the assessment points established benchmarks. As a result, a no CIP was prepared for assessment points not meeting benchmark. Assessment data for the following classes was not available and will be reviewed prior to the Fall 2017 semester: CIVL 3305, 4410, 4460.

B. Assessment Metrics and Methods of Student Outcomes

List the metric(s), measure(s) or performance indicator(s) used for each student outcome. Describe the process for collecting data or making assessments for each (tabular format is encouraged). Examples of assessment instruments can be electronically referenced in the self-study report and must be available for review at the time of the visit.

All assessment Metrics and Methods of SO's are shown in tabular format on the following pages.

C. Assessment Schedule and Frequency

Present the schedule and frequency for each type of assessment as well as points of accountability (tabular format is encouraged). Examples of assessments or data collected to date can be referenced electronically in the self-study report and must be available for review at the time of the visit.

All assessment schedule and frequency of SO's are shown in tabular format on the following pages.

D. Evaluation

Present the evaluation schedule, points of accountability, and expected level of attainment for each student outcome. Provide summaries of the results of evaluation analyses over time illustrating current attainment of each student outcome and trends in attainment over time (tabular presentation is encouraged). Describe how results are communicated and preserved and provide one or more examples electronically or in appendices.

Assessment evaluation of SO's are shown in tabular format on the following pages. Descriptions are provided within the tables. It should be noted that the Electronics Engineering Technology revamped the curriculum according to discussions with the IAC and faculty as part of the continued process improvement progression. The new curriculum was implemented fully in 2016 along with the creation of new assessment tools. The following SO charts will identify assessment data collected before 2016. Because of the new curriculum and new student model schedule initiated in 2016, only one set of data was collected in 2016 and 2017. During the 2018 and 2019 semesters, the assessment procedures were paused because of the new student outcomes initiated by ABET and our preparation for accreditation review in 2019. During the 2018-2019 semesters, student data was collected and boxed for ABET evaluator review according to plans discussed and implemented by the FSU ABET coordinator and staff.

Student Outcome 1: *An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems*

This outcome is linked to legacy outcomes "a,b,&f". The legacy outcome was used to measure new Student Outcome 1.

Legacy Outcomes mapped to New ABET SO 1	Courses where outcome exists (ELEC courses)	Specific Method of Assessment (rubric, etc.)	Courses Assessed (where the outcome and related data are collected)	Cycle of When the outcome Assessed (how often)	Year & Semester when Data Were Collected	Performance Target for outcome
a. an ability to apply knowledge, techniques, skills, and modern tools of the discipline to broadly defined engineering technology activities;	2270 3300 3310 3360 4410 4420 4401 4402	Direct: Project Indirect: Student survey	ELEC 2270	3 years	FALL 2017	70%
b. an ability to apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies	2270 3300 3310 3360 4410 4420 4401 4402	Direct: HW Problem Indirect: Student Survey	ELEC 3360	3 years	FALL 2017	70%
f. an ability to identify, analyze, and solve broadly-defined engineering technology problems;	2270 3300 3310 3360 4410 4420 4401 4402	Direct: Project Indirect: Student Survey	ELEC 4401	3 years	SPRIN 2017	70%

Summary of Aggregated Assessment Data:
Describe how the assessment data from each outcome is aggregated and provide an overall assessment data set. Use charts or formulas as necessary but include the numbers of students that were assessed.
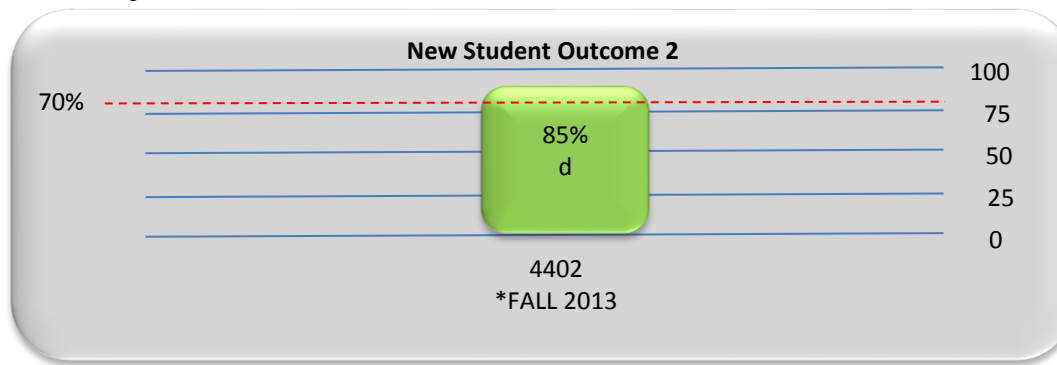
For summative assessment, the decision was made to focus on the direct assessment for all indicators.
Outcome a is linked to SO 1: Only 1 set of data collected because of revised curriculum in 2016. All students in the course were assessed. The course enrollment is typically 12
Outcome b is linked to SO 1: Only 1 set of data collected because of revised curriculum in 2016. All students in the course were assessed. The course enrollment is typically 12
Outcome f is linked to SO 1: Only 1 set of data collected because of revised curriculum in 2016. All students in the course were assessed. The course enrollment is typically 12

Results of Evaluation of Aggregated Assessment Data:
Based on aggregated assessment data, provide evaluation and analysis to illustrate the extent to which the student outcome is being attained. Use of charts/graphs with an explanation is recommended.

New Student Outcome 1

	2270 FALL 2017	3360 FALL 2017	4401 SPRING 2017
70%	84% a	100% b	90% f

Actions for Continuous Improvement:
Briefly list the actions for program improvement that have resulted from the results of evaluation processes described above. Indicate any significant future program improvement plans based upon recent evaluations. Provide a brief rationale for each of these planned changes. Details can be provided in the following report section.

All targets were met and no improvements were made during this 6-year cycle. However, beginning Fall 2019, new Performance Indicators will be implemented for this and all student outcomes.

Results of Actions for Improvement
Briefly describe the results of any changes (whether or not effective) in those cases where re-assessment of the results has been completed. Details can be provided in the following report section.

As shown in the graphic above, all targets were met.

Assessment Instruments:
How are the assessment and evaluation results documented and maintained? Attach copies of the assessment instruments or materials referenced in your table. Attach samples of student work at various levels (poor, satisfactory, very good). This can be an appendix or separate file.

All assessment and evaluation results are documented on the departments Continuous Improvement (CI) form. The forms are filed in the Assessment file storage and reviewed when the cycle dictates. Annual faculty collaborative reports summarize all assessments and continuous improvement changes.
Examples of the assessment instruments and student work can be found in the on-site in the FSU ABET cabinets.

Student Outcome 2: *An ability to design systems, components, or processes for broadly defined engineering technology problems appropriate to the discipline*

This outcome is linked to legacy outcome "d". The legacy outcome was used to measure new Student Outcome 2.

Legacy Outcomes mapped to New ABET SO 2	Courses were PI exists (ELEC courses)	Specific Method of Assessment (rubric, etc.)	Courses Assessed (where the PI and related data are collected)	Cycle of When the PI Assessed (how often)	Year & Semester when Data will be Collected	Performance Target for PI
d. an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives;	2270 3300 3310 3360 4410 4420 4401 4402	Direct: Project rubric Indirect: Student survey	ELEC 4402	3 years	FALL 2013	70%

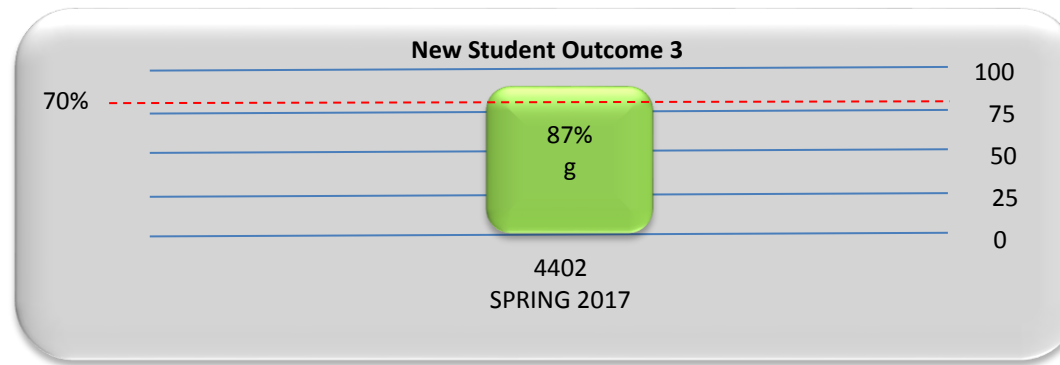**Summary of Aggregated Assessment Data (across all PIs):**
Describe how the assessment data from each PI is aggregated and provide an overall assessment data set. Use charts or formulas as necessary but include the numbers of students that were assessed.

For summative assessment, the decision was made to focus on the direct assessment for all indicators.

Outcome d is linked to SO 3:Assessment data was aggregated in 2013. All students in the course were assessed. The course enrollment is typically 8. .

Results of Evaluation of Aggregated Assessment Data:
Based on aggregated assessment data, provide evaluation and analysis to illustrate the extent to which the student outcome is being attained. Use of charts/graphs with an explanation is recommended.
*The data for this assessment was collected before the 2016 curriculum changes.

New Student Outcome 2

70% ------- 85% d

100
75
50
25
0

4402
*FALL 2013

Actions for Continuous Improvement:
Briefly list the actions for program improvement that have resulted from the results of evaluation processes described above. Indicate any significant future program improvement plans based upon recent evaluations. Provide a brief rationale for each of these planned changes. Details can be provided in the following report section.

All targets were met and no improvements were made during this 6-year cycle. However, beginning Fall 2019, new Performance Indicators will be implemented for this and all student outcomes.

Results of Actions for Improvement
Briefly describe the results of any changes (whether or not effective) in those cases where re-assessment of the results has been completed. Details can be provided in the following report section.

As shown in the graphic above, all targets were met.

Assessment Instruments:
How are the assessment and evaluation results documented and maintained? Attach copies of the assessment instruments or materials referenced in your table. Attach samples of student work at various levels (poor, satisfactory, very good). This can be an appendix or separate file.

All assessment and evaluation results are documented on the departments Continuous Improvement (CI) form. The forms are filed in the Assessment file storage and reviewed when the cycle dictates. Annual faculty collaborative reports summarize all assessments and continuous improvement changes. Examples of the assessment instruments and student work can be found in the on-site display.

Student Outcome 3: *An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature*

This outcome is linked to legacy outcome "g". The legacy outcome was used to measure new Student Outcome 3.

Legacy Outcomes mapped to New ABET SO 3	Courses were PI exists (ELEC courses)	Specific Method of Assessment (rubric, etc.)	Courses Assessed (where the PI and related data are collected)	Cycle of When the PI Assessed (how often)	Year & Semester when Data Were Collected	Performance Target for PI
g. an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;	2270 3300 3310 3360 4410 4420 4401 4402	Direct: Project Indirect: Student Survey	ELEC 4401	3 years	Spring 2017	70%

Summary of Aggregated Assessment Data (across all PIs):
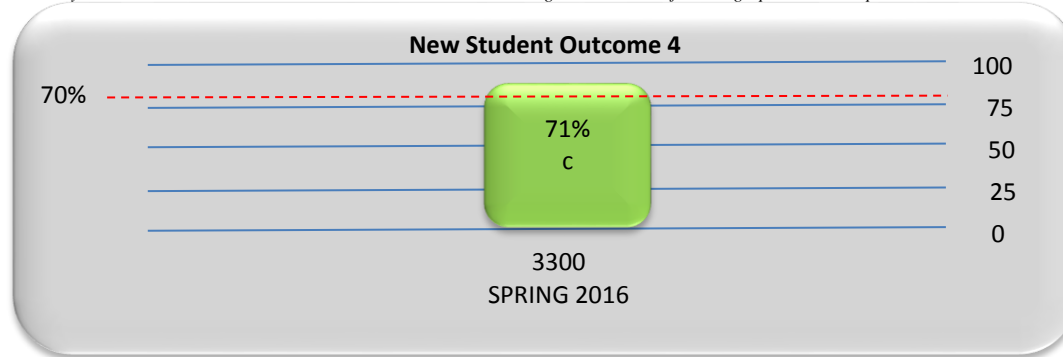*Describe how the assessment data from each PI is aggregated and provide an overall assessment data set. Use charts or formulas as necessary but include the numbers of students that were assessed.*

For summative assessment, the decision was made to focus on the direct assessment for all indicators.

Outcome g is linked to SO 3: Only 1 set of data collected because of revised curriculum in 2016. All students in the course were assessed. The course enrollment is typically 12

Results of Evaluation of Aggregated Assessment Data:
Based on aggregated assessment data, provide evaluation and analysis to illustrate the extent to which the student outcome is being attained. Use of charts/graphs with an explanation is recommended.

New Student Outcome 3

70%

87%
g

100
75
50
25
0

4402
SPRING 2017

Actions for Continuous Improvement:
Briefly list the actions for program improvement that have resulted from the results of evaluation processes described above. Indicate any significant future program improvement plans based upon recent evaluations. Provide a brief rationale for each of these planned changes. Details can be provided in the following report section.

All targets were met and no improvements were made during this 6-year cycle. However, beginning Fall 2019, Performance Indicators will be implemented for this and all student outcomes.

Results of Actions for Improvement
Briefly describe the results of any changes (whether or not effective) in those cases where re-assessment of the results has been completed. Details can be provided in the following report section.
As shown in the table above, all targets were met.

Assessment Instruments:
How are the assessment and evaluation results documented and maintained? Attach copies of the assessment instruments or materials referenced in your table. Attach samples of student work at various levels (poor, satisfactory, very good). This can be an appendix or separate file.

All assessment and evaluation results are documented on the departments Continuous Improvement (CI) form. The forms are filed in the Assessment file storage and reviewed when the cycle dictates. Annual faculty collaborative reports summarize all assessments and continuous improvement changes. Examples of the assessment instruments and student work can be found in the on-site display.

Student Outcome 4: _An ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiment_

This outcome is linked to legacy outcome "c". The legacy outcome was used to measure new Student Outcome 4.

Performance Indicators (PI) for this outcome	Courses were PI exists (ELEC courses)	Specific Method of Assessment (rubric, etc.)	Courses Assessed (where the PI and related data are collected)	Cycle of When the PI Assessed (how often)	Year & Semester when Data Were Collected	Performance Target for PI
c. an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;	2270 3300 3310 3360 4410 4420 4401 4402	Direct: Lab Assignment Indirect: Student survey	ELEC 3300	3 years	Spring 2017	70%

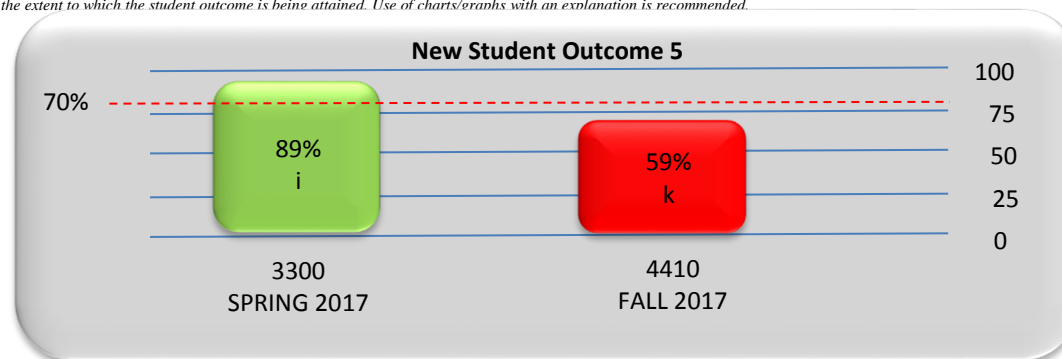**Summary of Aggregated Assessment Data (across all PIs):**
Describe how the assessment data from each PI is aggregated and provide an overall assessment data set. Use charts or formulas as necessary but include the numbers of students that were assessed.

For summative assessment, the decision was made to focus on the direct assessment for this outcome.

Outcome c is linked to SO 4: Assessment data was aggregated in 2016. All students in the course were assessed. The course enrollment is typically 10.

Results of Evaluation of Aggregated Assessment Data:
Based on aggregated assessment data, provide evaluation and analysis to illustrate the extent to which the student outcome is being attained. Use of charts/graphs with an explanation is recommended.

New Student Outcome 4

70% ----- (red dashed line)

71%
c

3300
SPRING 2016

100
75
50
25
0

Actions for Continuous Improvement:
Briefly list the actions for program improvement that have resulted from the results of evaluation processes described above. Indicate any significant future program improvement plans based upon recent evaluations. Provide a brief rationale for each of these planned changes. Details can be provided in the following report section.

All targets were met and no improvements were made during this cycle. However, beginning Fall 2019, Performance Indicators will be implemented for this and all student outcomes.

Results of Actions for Improvement
Briefly describe the results of any changes (whether or not effective) in those cases where re-assessment of the results has been completed. Details can be provided in the following report section.

As shown in the table above, all targets were met.

Assessment Instruments:
How are the assessment and evaluation results documented and maintained? Attach copies of the assessment instruments or materials referenced in your table. Attach samples of student work at various levels (poor, satisfactory, very good). This can be an appendix or separate file.

All assessment and evaluation results are documented on the departments Continuous Improvement (CI) form. The forms are filed in the Assessment file storage and reviewed when the cycle dictates. Annual faculty collaborative reports summarize all assessments and continuous improvement changes. Examples of the assessment instruments and student work can be found in the on-site display.

Student Outcome 5: *An ability to function effectively as a member of a technical team*
This outcome is linked to legacy outcomes "i and k". The legacy outcome was used to measure new Student Outcome 5.

Performance Indicators (PI) for this outcome	Courses were PI exists (CIVL courses)	Specific Method of Assessment (rubric, etc.)	Courses Assessed (where the PI and related data are collected)	Cycle of When the PI Assessed (how often)	Year & Semester when Data Were Collected	Performance Target for PI
i. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;	1100 2200 2210 2220 2230 2240 3305 3340 4400 4470	Direct: Lab assignment Indirect: Student survey	ELEC 3300	3 years	SPRING 2017	70%
k. a commitment to quality, timeliness, and continuous improvement;	1100 2200 2210 2220 2230 2240 3305 3340 4400 4470	Direct: HW Assignment Indirect: Student survey	ELEC 4410	3 years	FALL 2017	70%

Summary of Aggregated Assessment Data (across all PIs):
Describe how the assessment data from each PI is aggregated and provide an overall assessment data set. Use charts or formulas as necessary but include the numbers of students that were assessed.

For summative assessment, the decision was made to focus on the direct assessment for all indicators.

Outcomes i and k are linked to SO5: All students in the course were assessed. The course enrollment is typically 12

Results of Evaluation of Aggregated Assessment Data:
Based on aggregated assessment data, provide evaluation and analysis to illustrate the extent to which the student outcome is being attained. Use of charts/graphs with an explanation is recommended.

Actions for Continuous Improvement:
Briefly list the actions for program improvement that have resulted from the results of evaluation processes described above. Indicate any significant future program improvement plans based upon recent evaluations. Provide a brief rationale for each of these planned changes. Details can be provided in the following report section.

All targets were met for outcome i and no improvements were made during this cycle. However, outcome k did not meet the 70% threshold and requires process improvement.

Results of Actions for Improvement
Briefly describe the results of any changes (whether or not effective) in those cases where re-assessment of the results has been completed. Details can be provided in the following report section.
As shown in the table above, the target for outcome I was met, but not outcome k.
Because of the low score for outcome k, the instructor will spend more time discussing the subject matter and communicate the importance of the assignment and associated assessment. Extra training and discussion about the significance of the work will be adopted for the next assessment.

Assessment Instruments:
How are the assessment and evaluation results documented and maintained? Attach copies of the assessment instruments or materials referenced in your table. Attach samples of student work at various levels (poor, satisfactory, very good). This can be an appendix or separate file.

All assessment and evaluation results are documented on the departments Continuous Improvement (CI) form. The forms are filed in the Assessment file storage and reviewed when the cycle dictates. Annual faculty collaborative reports summarize all assessments and continuous improvement changes. Examples of the assessment instruments and student work can be found in the on-site display.

E. Using Results for Continuous Improvement

Describe how the results of the evaluations (from section D above) and any other available information are systematically used as input in the continuous improvement of the program. Present points of accountability, schedule and frequency. Summarize deliberations, decisions and actions which have been implemented as a result of these evaluations and indicate any significant future program improvement plans including the rationale for each. Provide references in the appendices or electronically as evidence of deliberations and decisions on improvements and input used. Evidence might include evaluation reports, agendas, minutes, memos, etc.

The table above has boxes for this information. The program should describe the use of the results for individual Student Outcomes in the table above and summarize the use for all Student Outcomes in Section E.

Program changes due to assessment findings are explained and documented through the use of the Collaborative Review Reports for the program. The collaborative reports identify all assessed points under that assessment cycle, all actionable items, and offer a summary of modifications for improvement. These collaborative reports are shared with the IAC and feedback is provided by the IAC.

Indirect data is also used for continuous improvement. Each academic year, students are surveyed to provide indirect measurement of outcome success. Faculty review the surveys for points that do not meet benchmark or are repeatedly noted in student comments. This is also documented in the Collaborative review reports.

Major program changes are not implemented until multiple assessment cycles (in a row) demonstrate student performance below benchmark. Instructional and delivery methods are tweaked every semester to meet the needs of the student population. For example, delivery methods that may vary include in-class examples, homework problems, project scenarios, lab exercises, etc.   All collaborative reports shall be provided to the evaluator during site visit.

CRITERION 5. CURRICULUM

A. Program Curriculum

The applicable program criteria could include statements that add specificity to the curricular requirements found in Criterion 5 to differentiate the discipline designated by the program's title. These should be included in the program's coursework. Contact ABET at etac@abet.org if you have questions about the program criteria that apply to your program.

1. Complete Table 5-1 that describes the plan of study for students in this program including information on course offerings in the form of a recommended schedule by year and term along with average section enrollments for all courses in the program over the two years immediately preceding the visit. State whether the program is based on a quarter system or a semester system and complete a separate table for each option in the program.

Table 5-1 shows the CET curriculum plan of study. The program is based on a semester system. Fall and spring semesters are 16 weeks each. There are no current options in the CET program.

2. Describe how the curriculum aligns with the program educational objectives.

Curriculum Aligns with Program Objectives

The lower level major and general studies courses in the curriculum are chosen and developed to build a foundation for students regarding math, science, and liberal sciences. These learned competencies are then used in upper level courses to develop professional aptitudes. Table 5-2, below indicates how all courses align with the Program Objectives.

Program Educational Objectives	Course Alignment		
"broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve at the time of graduation and during the first few years following graduation." Graduates shall be competent in	*General Studies*	*Major Courses other than ELEC Courses*	*ELEC Courses*
1. Relate the concepts of self-directed lifelong learning and the ability to undertake further study and/or examinations specific to the discipline through demonstration of technical skills as a practicing professional, applying knowledge and discipline specific tools..	GS 10 GS 11	COMP 1110/1120	ELEC 2225 ED ELEC 2230 DE ELEC 3310 AMS ELEC 3360 COMM ELEC 4410 DAC ELEC 4401 Senior Proj 1
2. Evaluate results and develop professional documents relevant to the discipline and to communicate such findings to a technical and non-technical audience.	ENGL 1101 ENGL 1102 GS 6, 16	PHYS 1101 PHYS 1102 CHEM 1101	ELEC 2240 IE ELEC 2250 AC/DC MC ELEC 2270 Intro MS ELEC 4402 Senior Proj 2
3. Operate effectively in a diverse, multi-disciplinary environment demonstrating skills in leadership, professionalism and teamwork.	GS 12, 9	COMM 2202	ELEC 2280 PC ELEC 3300 ALE ELEC 4420 AAuto CTRL

Table 5-2

3. Describe how the curriculum and its associated prerequisite structure support the attainment of the student outcomes.

Prerequisite Structure Supports Program Outcomes

Prerequisites are assigned to each course to ensure that the students enter the course with the necessary competencies to successfully meet course outcomes. These prerequisites and course outcomes are clearly defined on the course syllabus. Table *5-3* below summarizes the necessary prerequisites for each course in the program.

For example, in the Electronics Engineering Technology program, Math, Technology, and Science skills are essential for many of the upper level Electronics Engineering Technology courses. Therefore, these courses are listed as pre-requisites for courses that deal with machine to machine communication, automation, PLCs and microcontrollers.

4. Attach a flowchart or worksheet that illustrates the prerequisite structure of the program's required courses.

Flowchart of Prerequisites
BSEET FSU

First Year Fall

ELEC 1100 ⟷ MATH 1510   ELEC 1120   ENGL 1101

First Year Spring

ELEC 2225 ⟷ ELEC 2210 ⟷ MATH 1520   COMP 1120   ENGL 1103

Second Year Fall

TECH 2290   ELEC 2230   ELEC 2250   PHYS 1101

Second Year Spring

TECH 3300   ELEC 2280   ELEC 2240   COMM 2202   PHYS 1102

Third Year Fall

ELEC 2270   ELEC 3360   TECH ELEC

Third Year Spring

ELEC 3310   ELEC 3300   CHEM 1101

Fourth Year Fall

ELEC 4420   ELEC 4410   TECH ELEC

Fourth Year Spring

ELEC 4401 ⟷ ELEC 4402   TECH ELEC

Prerequisite Link _____   Corequisite Link - - - - - - - - -

Figure 5-1

B.S.E.T in Electronics Engineering Technology			
Current Program			
Required Courses		**Credits**	**Prerequisites**
ELEC 1100	Circuit Analysis I	3	MATH 1510 or better
ELEC 1120	AC/DC Electronics Analysis	3	Co-requisite: ELEC 1100
ELEC 2210	Circuit Analysis II	3	ELEC 1120
ELEC 2225	Electronic Devices	3	ELEC 1120
ELEC 2230	Digital Electronics	3	ELEC 1120
ELEC 2250	AC/DC Machinery and Controls	3	ELEC 2230
ELEC 2240	Industrial Electronics	3	ELEC 2230
ELEC 2280	Programmable Controllers	3	ELEC 1100, MATH 1520 or better
ELEC 2270	Introduction to Microcontroller Systems	3	ELEC 2230
ELEC 3360	Communication Systems	3	ELEC 2225, ELEC 2230
ELEC 3300	Advanced Linear Electronics	3	ELEC 2270
ELEC 3310	Advanced Microcontroller Systems	3	ELEC 2270
ELEC 4410	Data Acquisition and Control Systems	4	ELEC 3300
ELEC 4420	Advanced Automation Controller Systems	3	ELEC 2280
ELEC 4401	Senior Electronics Project I	4	ELEC 2280, ELEC 3360
ELEC 4402	Senior Electronics Project II (Writing Intensive)	3	Co-requisite: ELEC 4401
MATH 1510	Applied Technical Math I	3	(ACT.SAT) Test Score
MATH 1520	Applied Technical Math II	3	(ACT.SAT) Test Score
TECH 2290	Engineering Analysis I	4	MATH 1520
TECH 3300	Engineering Analysis II	4	TECH 2290
CHEM 1101	Chemistry I	4	(ACT.SAT) Test Score
COMP 1110 or 1120	Principles of Programming I	3	(ACT.SAT) Test Score
PHYS 1101	Intro to Physics I	4	MATH 1102
PHYS 1102	Intro to Physics II	4	PHYS 1101

Table 5-3

5. Describe how your program meets the specific requirements for this program area in terms of hours and depth of study for each curricular area (Math and Basic Sciences, Discipline Specific Topics) specifically addressed by either the general criteria or the specific program criteria as shown in Table 5-1. It is helpful to describe how the coverage of algebra and trigonometry (for A.S. programs) or differential and integral calculus or other mathematics above the level of algebra and trigonometry (for B.S. programs) is accomplished. Please describe how the curriculum develops student proficiency in the use of equipment and tools common to the discipline is appropriate to the student outcomes and the discipline.

Curricular areas that have been identified by ABET's general criteria include competencies in college algebra, chemistry, and physics. Table *5-4* below outlines the terms of hours needed and the depth in which those competencies are used in the Electronics Engineering Technology Program.

Competency Area	Credit Hours	Contact Hours	Demonstration of Depth of Study: Electronics ET Courses in which Competencies are used
Math (Algebra, Trigonometry, Statistics, Calculus)	14	28	ELEC 1100, ELEC 2210, ELEC 2225, ELEC 2240, ELEC 2250, ELEC 3300, ELEC 3360, ELEC 4410, ELEC 4402
Chemistry	4	9	ELEC 1100, ELEC 2225, ELEC 2250
Physics	8	28	ELEC 1100, ELEC 2210, ELEC 2225, ELEC 2250, ELEC 2240, ELEC 3310, ELEC 3360, ELEC 4420, ELEC 4401

Table 5-4

6. Describe how the curriculum accomplishes a capstone or culminating experience (addressed by either the general or program criteria) and describe how this experience helps students attain related student outcomes as appropriate to the discipline and the degree (not degree level). Such description should give, consideration to factors such as engineering standards and codes; public health and safety; and local and global impact of engineering solutions on individuals, organizations and society.

Courses Requiring Cumulative Knowledge

ELEC 4401 (Senior Electronics Project I) and ELEC 4402 (Senior Electronics Project II) are the capstone courses for the BSEET program. ELEC 4401 requires the student to create, design, build and demonstrate the project, while ELEC 4402 requires the student to develop a detailed engineering report, presentation slides, and deliver a presentation of the technical aspects of the project.

The capstone project requires students to not only utilize and reflect on learning experiences and knowledge gained in previous classes, but apply the theory in a real-world project development. The project has many components that challenge the student's depth of knowledge. The design aspects of the project include knowledge of fundamental electronics (ELEC 1100, ELEC 1120,

ELEC 2210, ELEC 2230); and depending on the applications motors (ELEC 2250, ELEC 2240); controlling the motors (ELEC 2250, ELEC 3310); hardwired or wireless communication (ELEC 2270, ELEC 3360), system feedback (ELEC 3310, ELEC 4410), automation (ELEC 4420) and signal processing or interfacing (ELEC 3300, ELEC 3310). The cumulative knowledge and skills learned and developed in lower-level courses are used for successful completion of the capstone project.

7. Describe how professional and ethical responsibilities, respect for diversity, and quality and continuous improvement are addressed in the curriculum.

Legacy outcome "i" states: an understanding of and a commitment to address professional and ethical responsibilities, including a respect for diversity. This was assessed and measured in the course ELEC 3300 Advanced Linear Electronics. Students were required to develop a report that either discusses professional and ethic responsibilities by engineers or a report with a report that communicates the role of diversity in the workplace.

Legacy outcome "k" states: a commitment to quality, timeliness, and continuous improvement. This was assessed and measured in the course ELEC 4410 Data Acquisition and Control Systems. Students were required to produce a detailed report to solve a technical problem as a team effort. All data related to the technical problem must be acquired, compiled into tables and analyzed requiring the attributes of quality and timeliness.

8. If your program allows cooperative education or internships to satisfy curricular requirements specifically addressed by either the general or program criteria, describe the academic component of this experience and how it is evaluated by the faculty.

The Electronics Engineering Technology program does not have a formal internship or cooperative education program. These activities are encouraged and are advertised by the faculty members when opportunities arise. Throughout the year, we tour various engineering facilities which produces opportunities for developing relationships for internships. Also, our Industrial Advisory Committee members initiate internship opportunities with our students.

9. Describe by example how the evaluation team will be able to relate the display materials, i.e. course syllabi, textbooks, sample student work, etc., to each student outcome. (See the 2019-2020 APPM Section I.E.5.b. (2) regarding display materials.)

Display Materials at the Time of the Visit-Evaluators will review samples of displayed course materials including course syllabi, textbooks, example assignments and exams, and examples of student work, typically ranging from excellent through poor for only those courses that:

a) Support attainment of the program's student outcomes;

b) Develop subject areas supporting attainment of student outcomes or contained in specific program criteria requirements.

At the program's discretion, other materials that document efforts made to continuously improve curricula, or that illustrate novel, unusual or creative efforts to enrich the curriculum and/or attainment of student outcomes may be provided.

Wherever possible, materials should be provided online or electronically.

For all programs, evidentiary displays during the visit will thoroughly represent the Program Objectives, Course Information, and Program Outcomes. The following displays will be developed and presented to the visiting teams.

1. Program Educational Objectives: Since these are delivered and assessed through the use of various tools, all examples will be compiled and displayed for perusal. This includes the following:
   a. Exit interviews:
      Graduating seniors are interviewed by a third-party prior to graduation. Information garnered is used to make modifications to the program, courses, or delivery of materials.
   b. Meeting minutes from Industrial Advisory Committee, Employers, and Alumni

2. Course Information: For each major course, there will be provided a syllabus, textbook (where applicable), laboratory assignments (where applicable), and other course materials provided by the faculty.

3. Program Student Outcomes: Since this is the most vital component of the CIP, each outcome will be presented with distinct mapping to the courses that support it. Figure 5-2 represents the process that will be used for the visit.

Program Outcome 1 (a,e)	Assessment Points/Tools	Student Work
CIVL 2200 (a,e) CIVL 2290 (a,e) CIVL 2210 (a,e)	There will be six folders containing the assessment tools and results, as per the CIP, for these points.	There will be six corresponding folders containing student work for each assessment point.
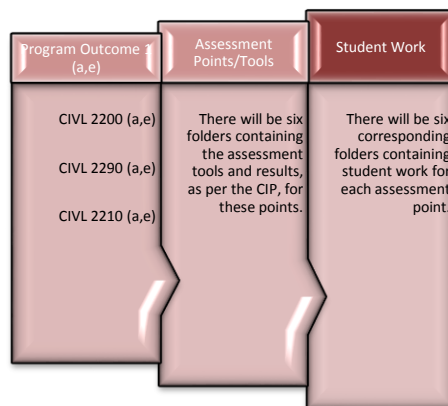
Figure 5-2

Each Program Outcome and the assessment point and tool will be displayed, and explained. Furthermore, the CIP information will be provided with the Program Outcomes

indicating actionable items and modifications to correct. Lastly, the student work samples for those outcomes will be available for review.

B. Course Syllabi

In Appendix A of the Self-Study Report, include a syllabus for each course used for the degree.

C. Advisory Committee

Describe the composition of the program's advisory committee and describe how it is representative of organizations being served by the program's graduates. Describe activities of the advisory committee and provide evidence that it periodically reviewing the program's curriculum and advising the program on its program educational objectives and the current and future aspects of the technical fields for which the graduates are being prepared.

The Electronics Engineering Technology's Industrial Advisory Committee (IAC) are composed of individuals from local industry. The main industries that our program serves are the power, coal and gas industries, and manufacturers. The advisory committee members are employed and have inside knowledge in these industries. Please see the following table of committee members and their employer and expertise.

Name	Employer	Job description
Mike Detch	Mylan Pharmaceuticals	Electrical Engineer
Jeff Holmes	Pillar Innovations	Senior Controls Engineer
Jim Kirby	First Energy	Senior Engineer
John Waugaman	Tygart Technology, Inc.	President
Paul Deavers	CED Mosebach Electric Supply	Regional Product Manager
William McKinsey	Federal Bureau of Investigation	Section Chief
Patrick Stevens	Novelis Light Gauge Products	Product Engineer
Kolt Decker	MarkWest Energy Partners	Engineer
Jim Goodwin	Retired Professor of Electronics ET	Fairmont State University
Clifton Jackson	Information Technology	Fairmont State University
Laurel Pell	Federal Bureau of Investigation	Engineer
Matt Wright	Federal Bureau of Investigation	Engineering Supervisor
Tom Bonazza	EWA-Government Systems, Inc	VP Embedded Systems Div.
Alex Patton	Monongahela Power Company	Director, Operations Services
Dr. William Mark Hart	MATH Energy Oil and Gas Co.	CEO

Table 5-5

The IAC meets annually to discuss trends, offer guidance, and review and support the continuous improvement initiatives of the program.   Appendix G provides a sample of the meeting agenda, minutes, and approval of proposed outcomes and objectives.

Table 5-1 Curriculum

Bachelors of Science: Electronics Engineering Technology

Course (Department, Number, Title) List all courses in the program by term starting with first term of the first year and ending with the last term of the final year.	Indicate Whether Course is Required, Elective, or a Selective Elective by an R, an E or an SE[2]	Math and Basic Sciences	Discipline Specific Topics	General Education	Other	Last Two Terms the Course was Offered: Year and Semester	Average Section Enrollment for the Last Two Terms the Course was Offered[1]
ELEC 1100 Circuit Analysis I	R		3 hours			F18, S19	30
ELEC 1120 AC/DC Electronics Analysis	R		3 hours			F17, F18	20
ENGL, 1101, Written English 1	R			3 hours		S19, F18	24
MATH, 1510, Applied Technical Math 1	R	3 hours				S19, F18	24
ELEC 2210 Circuit Analysis II	R		3 hours			S19, S18	12
ELEC 2225 Electronic Devices	R		3 hours			S18, S19	24
COMP 1110 or 1120 Intro to Programming	R		3 hours			S19, S18	24
MATH, 1520, Applied Technical Math 2	R	3 hours				S19, F18	24
ENGL, 1103, Technical Report Writing	R			3 hours		S19, F18	12
PHYS, 1101, Introduction to Physics I	R	4 hours				F18, S19	12
TECH, 2290, Engineering Analysis 1	R	4 hours				S19, F18	35
GS 10	E			2 hours		S18, S19	20
ELEC 2230 Digital Electronics	R		3 hours			F17, F18	12
ELEC 2250 AC/DC Machinery and Controls	R		3 hours			S19, F18	30
PHYS 1102, Introduction to Physics II	R	4 hours				S19 S18	24
TECH, 3300, Engineering Analysis II	R	4 hours				F18, S19	24
COMM, 2202, Communication in the World of Work	SE			3 hours		S19, F18	24
ELEC 2240 Industrial Electronics	R		3 Hours			S19 S18	12
ELEC 2280 Programmable Controllers	R		3 hours			S19, S18	12
GS 9	R			3 hours		F18, S19	24
GS 12	E			3 hours		F18, S19	24
TECH, Elective, Technical elective- Free According to List of Approved Courses	E				3 hours	Varies	Varies
ELEC 2270 Intro to Microcontroller Systems	R		3 hours			F17, F18	12
ELEC 3360 Communication Systems	R		3 hours			F17, F18	20
ELEC 3300 Advanced Linear Electronics	R		3 hours			S19, S18	12
ELEC 3310 Advanced Microcontroller Systems	R		3 hours			S19, S18	12
CHEM, 1101, General Chemistry 1	R	4 hours				S19, F18	12
GS 16	R			3 hours		F18, S19	20
GS 6	E			3 hours		F18, S19	20
GS 14	E			3 hours		F18, S19	24
TECH, Elective, Technical elective- Free According to List of Approved Courses	E				3 hours	Varies	Varies
ELEC 4410 Data Acquisition and Control Systems	R		4 hours			F17, F18	124
ELEC 4420 Advanced Automation Controller Systems	R		3 hours			F17, F18	12
GS 11	E			3 hours		F18, S19	24
GS 8, 13	E			3 hours		F18, S19	24
TECH, Elective, Technical elective- Free According to List of Approved Courses	E				3 hours	Varies	Varies
ELEC 4401 Senior Electronics Project I	R		3 hours			S19, S18	12
ELEC 4402 Senior Electronics Project II	R		4 hours			S19, S18	12
OVERALL TOTAL CREDIT HOURS FOR THE DEGREE		26	53	32	9		
PERCENT OF TOTAL		22%	44%	27%	7%		

1. For courses that include multiple elements (lecture, laboratory, recitation, etc.), indicate the average enrollment in each element.
2. Required courses are required of all students in the program, elective courses are optional for students, and selected electives are courses where students must take one or more courses from a specified group.

Instructional materials and student work verifying compliance with ABET criteria for the categories indicated above will be required during the campus visit.

CRITERION 6. FACULTY

A. Faculty Qualifications

Describe the qualifications of the faculty and how they are adequate to cover all the curricular areas of the program and also meet any applicable program criteria. This description should include the composition, size, credentials, and experience of the faculty. Complete Table 6-1. Include faculty curriculum vitae in Appendix B.

The Electronics Engineering Technology program is supported by two full-time faculty members. Each of the faculty member's qualifications is discussed below offering justification for expertise in given areas.

- **Musat Crihalmeanu, PE** – Musat Crihalmeanu earned his BS from Technical University, Cluj-Napoca, Romania and MS from West Virginia University. Professor Crihalmeanu has over 30 years of diverse work experience along with extensive ongoing research in the field of automation, solar energy, Programmable Logic Controllers (PLCs) and hardware and software related to electronic instrumentation. Professor Crihalmeanu is responsible for teaching courses that include PLCs, data acquisition and control systems, communications, and motor control classes. https://www.fairmontstate.edu/collegeofscitech/musat-crihalmeanu

- **Thomas M. McLaughlin** - Thomas McLaughlin earned his BS degree from West Virginia University and MS degree from Johns Hopkins University. Tom has over 25 years of work experience in field engineering, electronic integration, circuit design, and information security. His specialization is in microcontrollers and digital electronics. Professor McLaughlin has responsibilities in courses related to circuit analysis, microcontrollers, and digital and linear electronics. Tom serves as the Electronics ET program coordinator. https://www.fairmontstate.edu/collegeofscitech/thomas-mclaughlin

Table *6-1* is provided to summarize faculty qualifications.

Table 6-1. Faculty Qualifications

Electronics Engineering Technology

| Faculty Name | Highest Degree Earned- Field and Year | Rank [1] | Type of Academic Appointment[2] T, TT, NTT | FT or PT[3] | Years of Experience | | | Professional Registration/ Certification | Level of Activity[4] H, M, or L | | |
					Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/summer work in industry
Thomas M. McLaughlin	MS, Electrical Engineering- 1999	AST	TT	FT	32	5	5	None	L	M	L
Musat Crihalmeanu	MS, Electrical Engineering- 2003	AST	TT	FT	35	4	4	PE	L	H	M

Instructions: Complete table for each member of the faculty in the program. Add additional rows or use additional sheets if necessary. Updated information is to be provided at the time of the visit.

1. Code: P = Professor   ASC = Associate Professor   AST = Assistant Professor   I = Instructor   A = Adjunct   O = Other
2. Code: TT = Tenure Track   T = Tenured   NTT = Non-Tenure Track
3. At the institution
4. The level of activity, high, medium or low, should reflect an average over the year prior to the visit plus the two previous years.

B. Faculty Workload

Complete Table 6-2, Faculty Workload Summary and describe this information in terms of workload expectations or requirements for the current academic year.

Workload Expectations

For the current academic year faculty workload expectations are in line with previous years and university guidelines.

Both full-time faculty in the Electronics Engineering Technology program teach upwards of 27 credit hours per year. Both Professors have upgraded the course materials, subject matter and lab software/hardware in consultation with the department chair, dean and Industrial Advisory Committee, and University committees to reflect the changes in industry and high technology. The core curriculum reflects a strength in automation, circuit analysis, instrumentation, which features Programmable Logic Controllers and Microcontrollers and supportive current software languages used by industry.

Professor Crihalmeanu maintains his PE licensure in the state of West Virginia and Pennsylvania, teaches his regular 12-13 credit hours of course load per semester which includes data acquisition and control systems, communications, advanced automation concepts, and industrial electronics. Musat also offers a summer course in ac/dc machinery and controls. He continues to earn professional development hours and has recently attended workshops involving PLC training from Siemens and Allen Bradley systems. Musat has also assisted students in gaining valuable research experiences by writing and being awarded grants from NASA to develop robotic vision technologies, drone systems, and solar projects. Professor Crihalmeanu has been invaluable in assisting senior students in developing interesting projects to showcase their skills. Some of the diverse projects have included Solar Panel that Tracks the Sun, Long Wall Mining Emulsion Delivery System, PID Motor Control using a PLC, Motorized Metal Detector, Remote Control Floor Jack, Square Wave Synthesizer, Assisted Exercise Machine, Automated and Light Sensing Blinds for Home Automation to name this year's projects. Musat invests a lot of time assisting students overcome obstacles and instructing them how to design and troubleshoot systems.

Professor McLaughlin is responsible for 12 credit hours of course load per semester which includes Circuit Analysis, Digital Electronics, Microcontroller Systems, Advanced Linear Electronics, and Senior Electronics Projects. Tom has developed strong relationships with industrial partners that have assisted numerous students finding internship opportunities. The internship offers the student valuable work experience and good pay to help cover the high costs of education. Because of these efforts, Tom was instrumental in Fairmont State University receiving $16,500 from First Energy for instrumentation equipment for the electronic labs. Tom is responsible for outfitting the lab with the necessary equipment and electronic components by managing the program's yearly budget.

C. Faculty Size

Discuss the adequacy of the size of the faculty and describe the extent and quality of faculty involvement in interactions with students, student advising, and oversight of the program.

The Electronics Engineering Technology program are served by two full-time faculty members for an average enrollment of approximately 50 students per year. The academic advising is evenly divided between the faculty members so that each one is responsible for advising approximately 25 students. Faculty also share the responsibilities of other students activities including but not limited to industrial site tours, internship and employment assistance and curriculum management. The Electronics ET program is witnessing a spike in enrollment because of a more vibrant economy and by maintaining a stable teaching staff with a robust current model schedule. Students are learning the tools and instruction necessary to succeed in the workplace. Currently, a minimum of 2 faculty members are required to maintain a strong viable program.

D. Professional Development

Provide a description of program professional development support for faculty and a general description of how faculty avail themselves of these opportunities (specific recent activities for each faculty member should be noted in their CV in Appendix B).

Table 6-3 below summarizes the professional development activities for the Electronics Engineering Technology full-time faculty members.

Full-time Faculty Member	Professional Development Activities for 2018-2019
Musat Crihalmeanu, PE	• Attendance at all department lectures and meetings • ABET Continuous Improvement Workshop • PLC Training (Siemens, Allen Bradley)
Thomas M. McLaughlin	• Attendance at all department lectures and meetings • Faculty Senate representative for College of Science and Technology • ABET Continuous Improvement Workshop • Microcontroller Training (Parallax)

Table 6-3

E. Authority and Responsibility of Faculty

Describe the role played by the faculty with respect to course creation, modification, and evaluation, their role in the definition and revision of program educational objectives and student outcomes, and their role in the attainment of the student outcomes. Describe the

Role of Faculty in Curricular Concerns

Faculty members are considered program and content experts in their respective disciplines of study. As such, they maintain full autonomy over their respective programs of study. Faculty is expected to design the best possible programs of study, course and program outcomes, and extra-curricular activities to support student learning. At Fairmont State University, ABET faculty are expected to participate in ABET assessment and meet with their industrial advisory committees on a yearly basis to review the programs of study being offered in the Technology Department at Fairmont State University.

The Department of Technology's ABET accredited programs maintain a Continuous Improvement Plan that assists faculty in assuring that programs and course outcomes are being met and that the programs of study are relevant based on the business and industrial needs of our constituents. The faculty work directly with their industrial advisory committees to review faculty or student issues associated with meeting program and student outcomes and objectives.

The Role of Administration in Curricular Concerns

Administration relies heavily on faculty to assure that quality program of study are being offered at the institution. However, upper administration does not micromanage course or program outcomes or course development. The Dean of the College of Science and Technology and Provost are charged with monitoring the progress that students are making in program and course outcomes. Every five years, each program of study is reviewed by the institution to assure program quality and a sufficient number of graduates are able to enter the workforce. This data is reported to the West Virginia Higher Education Policy Council and the Board of Governors at Fairmont State University. Procedures are in place to address deficiencies in programs should the need arise.

All curriculum changes must be approved by the Curriculum Committee on the campus of Fairmont State University. Changes in curricula produce reactions that may be far-reaching in their effects. It is, therefore, important that all proposed changes be studied carefully before they are made.

1) An academic unit that wishes to propose a change in its curriculum should begin by communicating the nature of the change to all the faculty of the unit. The opinions of the unit's faculty should be reflected in the report of the proposed change, and proposals for curriculum changes should be forwarded only when they enjoy the support of the faculty of the unit. It is the Dean's role in the College of Science and Technology to assure that all faculty have access to the proposed curriculum, issues are addressed that may result from the curriculum change, and that faculty have an opportunity to vote on the proposed changes.
2) Proposals for change originating in academic units are forwarded to the Provost and Vice President for Academic Affairs [through the Associate Provost], who will be responsible for initial evaluation and recommendation.

3) After evaluating and consulting with the proposal's sponsors and other interested parties, the Provost and Vice President for Academic Affairs will recommend that the proposal be accepted, rejected, or modified; the proposal and recommendation are then submitted to the Curriculum Committee.

4) The Provost and Vice President may initiate proposals for curriculum change. The Provost and Vice President's proposals may be of two types: (a) those affecting existing instructional programs and academic units and (b) those bearing on the creation of new programs. Proposals of the first type should be submitted to the affected unit for its approval. Proposals of the second type should be submitted to the Academic Affairs Council for its approval. The position of the body is then included in the report forwarded to the Curriculum Committee.

5) The Curriculum Committee then reviews the decisions of the Provost and Vice President for Academic Affairs, especially those of major importance to the University and those receiving negative recommendations. The Curriculum Committee also must hear appeals from any member of the faculty or any School of the University.

6) All actions taken by the Curriculum Committee are to be reported at regular intervals to the Faculty Senate, where final decisions concerning all curriculum matters will be made. In the case of rejected proposals, reversals of the Provost and Vice President's recommendations, or decisions that have been appealed, the Curriculum Committee must supply the Senate with detailed information.

The following deadlines are to be used when determining the "Implementation Date Requested" entry on curriculum proposals:

Any curriculum change that is to become effective at the beginning of a school year must be approved before January 1 of the preceding academic year. Any change that is to become effective at the beginning of a spring semester must be approved before the end of the preceding year. It should be noted that "approved" in this instance means final approval by the Faculty Senate or, if appropriate, by the Higher Education Policy Commission.

All institutional grant proposals, regardless of the source of funding, which propose the creation of new academic programs, must be approved by the Board of Governors prior to submission to the funding agency.

The Higher Education Policy Commission requires the President of the University to inform the Board as soon as the institution begins to plan for the addition or deletion of an academic degree program.

Each institution must submit to the Board formal proposals for new academic programs in conformity with the currently approved Procedures and Format for the Submission of New Academic Program Proposals.

Table 6-1. Faculty Qualifications

Electronics Engineering Technology

Faculty Name	Highest Degree Earned- Field and Year	Rank [1]	Type of Academic Appointment[2] T, TT, NTT	FT or PT[3]	Years of Experience			Professional Registration/ Certification	Level of Activity[4] H, M, or L		
					Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/summer work in industry
Thomas M. McLaughlin	MS, Electrical Engineering- 1999	AST	TT	FT	32	5	5	None	L	M	L
Musat Crihalmeanu	MS, Electrical Engineering- 2003	AST	TT	FT	35	4	4	PE	L	H	M

Instructions: Complete table for each member of the faculty in the program. Add additional rows or use additional sheets if necessary. Updated information is to be provided at the time of the visit.

1. Code: P = Professor   ASC = Associate Professor   AST = Assistant Professor   I = Instructor   A = Adjunct   O = Other
2. Code: TT = Tenure Track   T = Tenured   NTT = Non-Tenure Track
3. At the institution
4. The level of activity, high, medium or low, should reflect an average over the year prior to the visit plus the two previous years.

Table 6-2. Faculty Workload Summary
Electronics Engineering Technology as of FALL 2016

Faculty Member (name)	PT or FT[1]	Classes Taught (Course No./Credit Hrs.) Term and Year[2]	Program Activity Distribution[3]			% of Time Devoted to the Program[5]
			Teaching	Research or Scholarship	Other[4]	
Thomas M. McLaughlin	FT	ELEC 1100, 3 hrs - Fall 2018	75%	10%	15%	100%
		ELEC 1120, 3 hrs – Fall 2018				
		ELEC 2230, 3 hrs – Fall 2018				
		ELEC 2270, 3 hrs – Fall 2018				
		ELEC 2210, 3 hrs – Spring 2019				
		ELEC 3300, 3 hrs – Spring 2019				
		ELEC 3310, 3 hrs – Spring 2019				
		ELEC 4402, , 3 hrs – Spring 2019				
		ELEC 4402, , 3 hrs – Spring 2019				
Musat Crihalmeanu	FT	ELEC 2250, 3 hrs – Summer 2018	75%	10%	15%	100%
		ELEC 2250, 3 hrs - Fall 2018				
		ELEC 3360, 3 hrs - Fall 2018				
		ELEC 4410, 4 hrs - Fall 2018				
		ELEC 4420, 3 hrs - Fall 2018				
		ELEC 2225, 3 hrs – Spring 2019				
		ELEC 2240, 3 hrs – Spring 2019				
		ELEC 2280, 3 hrs – Spring 2019				
		ELEC 4401, 4 hrs – Spring 2019				

1. FT = Full Time Faculty or PT = Part Time Faculty, at the institution
2. For the academic year for which the Self-Study Report is being prepared.
3. Program activity distribution should be in percent of effort in the program and should total 100%.
4. Indicate sabbatical leave, etc., under "Other." (i.e. advising students, interfacing with industrial partners, assisting with student resumes, assisting student projects)

5. Out of the total time employed at the institution. *If a faculty member teaches for more than one program or is an administrator, indicate level of effort for only specific program activities (teaching, etc.).*
6. *Do not include faculty in units that teach service courses, e.g., math or science.*

CRITERION 7. FACILITIES[1]

A. Offices, Classrooms and Laboratories

Summarize each of the program's facilities in terms of their ability to support the attainment of the student outcomes and to provide an atmosphere conducive to learning.

1. Offices (such as administrative, faculty, clerical, and teaching assistants) and any associated equipment that is typically available there.

2. Classrooms and associated equipment that are typically available where the program courses are taught.

3. Laboratory facilities including those containing computers (describe available hardware and software) and the associated tools and equipment that support instruction. Include those facilities used by students in the program even if they are not dedicated to the program and state the times they are available to students. Complete Appendix C containing a listing of the major pieces of equipment used by the program in support of instruction.

The Engineering Technology Building on the main campus of Fairmont State University currently houses the Department's administrative, faculty, clerical offices, classrooms and labs. The facilities are equipped with the tools needed for faculty to appropriately guide students in the attainment of the student educational outcomes. The layout and atmosphere are intended to be conducive to learning. Laboratory and Classroom equipment is regularly maintained an upgraded as needed.

The main office is located on the third floor near the main entrance; most faculty offices are of the fourth floor. The office for the Dean of College of Science and Technology is located on the second floor.

The Electronics Engineering Technology classes utilize four main rooms and are on the third floor of the Engineering Technology Building as shown below:

Room 307: The main instrumentation laboratory, features 10 instrumentation workstations, and can easily accommodate 20 students.

Room 309: The main simulation laboratory and combined lecture facility housing 15 computer workstations, and can easily accommodate 15 students.

Room 311: The main power laboratory and combined lecture facility houses six three-phase power workstations, and can accommodate up to 30 students.

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[1] Include information concerning facilities at all sites where program courses are delivered.

Room 313: Lecture room only can accommodate up to 30 students for lectures.

All four rooms are used exclusively for the Electronics program, except for room 313 which is sometimes used by the Mathematics Department. Each room is equipped to allow instructors to present using digital projectors. The third and fourth floors of the ET Building have auditoriums that can seat 120 students and are used for industrial partner presentations and departmental meetings.

B. Computing Resources

Describe any computing resources (workstations, servers, storage, networks including software) in addition to those described in the laboratories in Part A, which are used by the students in the program. Include a discussion of the accessibility of university-wide computing resources available to all students via various locations such as student housing, library, student union, off-campus, etc. State the hours the various computing facilities are open to students. Assess the adequacy of these facilities to support the scholarly and professional activities of the students and faculty in the program.

There are approximately 2,400 computers on campus of which approximately 1,200 are available for student use related to instruction and another 325 are in use by full-time faculty.

There are nearly 80 computer labs, mobile computer carts, and classrooms with instructor stations with access to audio/visual resources on campus. There are 9 labs and 5 classrooms dedicated to the Engineering Technology program. Engineering Technology students may also use any of the publicly accessible labs and work stations that are located throughout the Library and in the Student Center.

Network access, as well as access to the open internet, is provided campus-wide. Every office, classroom, lab, and residence hall room are fully networked. Free, fast, reliable, and secure wireless internet connectivity is available from anywhere on campus.

C. Guidance

Describe how students in the program are provided appropriate guidance regarding the use of the tools, equipment, computing resources, and laboratories.

The Electronics Engineering Technology program contains courses that offer both textbook examples as well as practical applications. There are sixteen required ELEC courses for the BSEET degree and only two of these courses do not require laboratory work, bur are strictly theoretical. Student laboratories have the Professor as the lab assistant. Therefore students receive one-on-one lab assistance for guidance on the equipment and understanding of the circuit. Each lab has an accompanying sheet(s) that provide a circuit, and places for data entry of measurements and calculations. Students are required to use standard bench instrumentation such as function generators, oscilloscopes, multimeters, and power supplies. The labs are furnished with computers and software applications for further simulation and analysis. Students are exposed to interfacing external electronics with microcontrollers using an integrated development environment and coding in C and C++

which are standard programming languages use in industry. The PLC courses provide experiences and exercises similar to real-world industrial automation.

D. Maintenance and Upgrading of Facilities

Describe the policies and procedures for maintaining and upgrading the tools, equipment, computing resources, and laboratories used by students and faculty in the program.

The College of Science and Technology receives an appropriation each year to provide instruction (i.e., faculty and adjunct pay), purchase and repair existing equipment, and support faculty development. In addition, there is an appropriation based on the number of students enrolling in classes and paying lab fees. These lab fees can be used to support instruction, purchase and repair existing equipment, or support faculty development. Overall, the funding is constrained in the College. However, the College has used its funding efficiently, and has been able to purchase and repair existing equipment on a yearly basis. Every four to five years the College has a major expense in the purchase of new computers. The Dean of the College attempts to stagger these purchases and roll out new hardware on a planned basis so as not to use all of the resources in one year.

All programs of study have a budget that is allocated at the beginning of the year. These funds can be used to hire teaching assistants, purchase and repair equipment, support student clubs and extra-curricular activities, and for purchasing expendable supplies. Major repairs are paid for by the Dean's budget so as not to adversely impact program budgets. Faculty maintain complete autonomy over the use of their budgets provided they are within state guidelines. Should a program of study run short of funding due to unforeseen circumstances, their budget may be offset by the College of Science and Technology.

E. Library Services

Describe and evaluate the capability of the library (or libraries) to serve the program including the adequacy of the library's technical collection relative to the needs of the program and the faculty, the adequacy of the process by which faculty may request the library to order books or subscriptions, the library's systems for locating and obtaining electronic information, and any other library services relevant to the needs of the program.

Fairmont State University has two libraries that may be used by all students, faculty and staff members. The Ruth Ann Musick Library is located on the main campus, and the Aerospace Library is located at the National Aerospace Education Center (NAEC) in Bridgeport. These libraries actively support the academic programs of the University. Library personnel (currently 15 staff members) work closely with faculty and students to develop research skills and to provide a wide range of support services that are designed to enhance the learning experience. The print and electronic resources support the needs of all the engineering technology programs while encouraging intellectual and personal growth.

The Fairmont State University Libraries provide access to over 500,000 books in both print and electronic format, as well as print periodicals, government documents, compact

discs, videos, and other multimedia, and to nearly 100 electronic databases. Subscriptions to more than 28,000 unique journals and newspapers, available in either print or online full text, provide the latest information for all disciplines.

The libraries hold over 23,000 print and electronic books, over 500 academic journals, and over 400,000 full text articles relating specifically to engineering and/or engineering technology. All print materials are classified according to the Library of Congress classification system and online resources are accessible via the library website, 24/7

The libraries hold over 700 print and electronic books, over 64 academic journals, and over 36,000 full text articles relating specifically to occupational safety. All print materials are classified according to the Library of Congress classification system and online resources are accessible via the library website, 24/7.

F. Overall Comments on Facilities

Describe how the program ensures the facilities, tools, and equipment used in the program are safe for their intended purposes. (See the 2019-2020 APPM section I.E.5.b.(1).)

The facilities in the College of Science and Technology are well maintained. Equipment in disrepair is identified and removed if it is deemed unsafe. The equipment is either repaired or taken out of service. The College does have three laboratory technicians that help to assure that our facilities and equipment are up-to-date and in working order. One technician is assigned to the Technology Department in the Engineering Technology Building, and two are assigned to Hunt Haught Hall (i.e., one in Chemistry and one in Biology and Geoscience). The Physical Plant on campus maintains all of the buildings on campus, and the majority of costs associated with upkeep and repair do not come from College budgets. The same is also true for maintaining our technological infrastructure. However, the College is charged for the repair or updating of all instructional technology devices used in classrooms and laboratories. Over the past five years, this has been a priority (i.e., updating existing teaching technology, investing in SMART Classrooms, and providing adequate computer hardware and software for faculty and students) in the College of Science and Technology. Recently, Room 309 in the ET building received an upgrade of faster (5 core) machines to make running simulation and software intensive programs efficiently. Computers were also added to room 307 to facilitate lab exercises and report writing.

CRITERION 8. INSTITUTIONAL SUPPORT

A. Leadership

Describe the leadership of the program and discuss its adequacy to ensure the quality and continuity of the program and how the leadership is involved in decisions that affect the program.

The Electronics Engineering Technology program is directed by a Program Coordinator who reports directly to the Chair of the Department of Technology who is under the Dean of the College of Science and Technology. The Program Coordinator is instrumental in curriculum revisions, program changes, course development, managing the program's budget, and all other aspects of the day-to-day operations of the program. Since there are two full-time faculty members in the program (one being the coordinator), any decisions on matters that affect the program are usually made jointly. Excluding general studies requirements, and degree hour limitations, the coordinator has complete control of academic issues. However, consults with the faculty, IAC, and Dean prior to changes to the curriculum. This ensures meeting the needs of the constituencies as well as working within the framework of the university.

B. Program Budget and Financial Support

1. Describe the process used to establish the program's budget and provide evidence of continuity of institutional support for the program. Include the sources of financial support including both permanent (recurring) and temporary (one-time) funds.

The Dean of the College organized the budgets using historical data (i.e., FTE's, student enrollments, amount of expendable supplies used, etc.). Using the data as a baseline, each program area is provided with a set budget, and faculty were provided complete autonomy over how that budget could be spent. As previously noted the College of Science and Technology receives an appropriation each year to provide instruction (i.e., faculty and adjunct pay), purchase and repair existing equipment, and support faculty development. In addition, there is an appropriation based on the number of students enrolling in classes and paying lab fees. These lab fees can be used to support instruction, purchase and repair existing equipment, or support faculty development.

The current process used to allocate budgets to program areas appears to be working. However, adjustments are needed every couple of years to reflect student growth or special needs in any particular program. At various times a program may expend all of their funding due to unforeseen circumstances. The College has been very fortunate in that it has always been able to meet these expenditures without detriment to students or the program of study.

2. Describe how teaching is supported by the institution in terms of graders, teaching assistants, teaching workshops, etc.

The institution supports faculty in teaching by providing numerous professional development experiences during an academic year. As a teaching institution (and not a Research I Institution), Fairmont State University values teaching above all other criteria. The institution provides hardware and software to assist faculty in the teaching of their courses. This consists of Blackboard as a component for delivery of content, at minimum, for syllabus and course grades. Classrooms are equipped with Sympodia. Software that is supported through instructional technology includes Respondus, StudyMate Server, Camtasia, SafeAssign, Wimba Classroom, Wimba Voice Tools, and the Lockdown Browser.

Strategies undertaken to ensure success in the use of Instructional Technology:
- The Teaching and Learning Commons was established to merge services of the Help Desk with Blackboard services and other technology-related needs. The Teaching and Learning Commons was re-located to the Library where expanded hours are available. The wireless network has been expanded to all parts of the campus.
- Computer labs have been updated and will continue on a three-year replacement cycle. FSU is also in the process of implementing an intra-net so that some documents and information will not be available to the public, but so students will receive information they need for their classes and majors.
- Student mobile technologies (i.e. Smartphones and laptop computers) have been integrated into courses for enhanced electronic delivery. Students have Smartphone access to an e-web site for ease of information transfer and can also get their Blackboard courses via their smart phones.
- Fairmont State is in the process of implementing cloud computing so that students might have access to any software they need anywhere on campus. This may be accessed in a regular computer lab, by their laptop through the wireless network, by any other device such as an I Pad that they might bring to campus, or by their Smartphone. This would further enhance learning especially for students that work while attending school.
- The College of Science and Technology had also received a Title III Grant from the Department of Education to support student retention, increase graduation rates, provide peer mentors, and to purchase new technology in increase student learning and development. The grant has been completed.

3. To the extent not described above, describe how resources are provided to acquire, maintain, and upgrade the infrastructures, facilities, and equipment used in the program.

The Physical Plant on campus maintains all of the buildings on campus, and the majority of costs associated with upkeep and repair do not come from College budgets. The same is also true for maintaining our technological infrastructure. However, the College is charged for the repair or updating of all instructional technology devices used in classrooms and laboratories. Over the past five years, this has been a priority (i.e.,

updating existing teaching technology, investing in SMART Classrooms, and providing adequate computer hardware and software for faculty and students) in the College of Science and Technology.

The Dean of every College or School submit financial plans and needs to the Budget Committee. In the annual budget planning process, one first identifies the mission or strategic plan agenda to be funded and the accompanying rationale. Second, the resources required for accomplishing that mission or plan must be determined and may include additional personnel (i.e. wages and benefit costs) or operating expense dollars for activities such as the purchase of supplies, equipment, or allocation for travel expenses. Budget resources may come from adjustments to tuition and fees, state appropriations, enrollment, and / or a reallocation of existing resources. Lastly, after the mission or plan is established and institutional resources have been allocated for its achievement, it is important that there is some measure of the success of the activities toward the targeted goals. Again, the College has been fortunate to receive funding to support student academic success in meeting program and course outcomes, equipment, and professional development of faculty and staff.

4. Assess the adequacy of the resources described in this section with respect to the students in the program being able to attain the student outcomes.

As with any organizations, increased funding that is budgeted well could result in improved educational efforts. However, the allocation and use of funds in the program provides for adequate emphasis and work toward student outcomes. With the upgrades in facilities, and equipment over the last ten years, students have been exposed to industry-quality experiences. This addresses the outcomes of developing technical competencies, communication skills, and professional awareness. In addition to the state funding, this program works to develop relationships with industry as a way to give the students the opportunity of field experiences through site tours and internships.

C. Staffing

Describe the adequacy of the staff (administrative, instructional, and technical) and institutional services provided to the program. Discuss methods used to retain and train staff.

The University has allowed the College to fill necessary positions based on the existing budget available to the College. There is an adequate number of support staff, and faculty for the College to be successful. The university is currently undergoing a re-alignment of all colleges and programs. The new model, although not finalized as of this SSR, should provide the program with adequate staff.

Fairmont State University regularly provides professional development activities for faculty, staff, and administrators on campus. These professional development activities occur on a regular basis, and some of them call for required attendance. All faculty and staff in the

College have the ability to utilize professional development funds to meet their own educational needs.

Mentorship is key to training new faculty or staff. In the College of Science and Technology each new staff or faculty member is assigned a peer mentor for the first year. This mentor meets regularly with the new staff or faculty member to assist in their career development and to help answer questions related to their job roles, teaching, or service.

D. Faculty Hiring and Retention

1. Describe the process for hiring of new faculty.
2. Describe strategies used to retain current qualified faculty.

In the hiring process of new faculty, the Dean of the College will gain approval for the position from the Provost, President, Office of Finance, and Human Resources. A position description is written with the assistance of faculty from that particular program of study. The position is then advertised in local and regional newspapers and in the Chronicle of Higher Education. Prior to releasing the candidates for review by the department, Human Resources will vet the pool of candidates to assure for diversity among the candidates.

Candidates are then screened by the faculty of the department. This is usually done with telephone or Skype interviews. The top 3-4 candidates are then requested to come to campus and present a 'teaching lesson' to the faculty of the department. Recommendations are then made to the Dean and Provost of the University. In this process, faculty take the lead role in recommending hires. All successful candidates must pass a criminal history background check prior to being hired.

The College uses a mentorship strategy to help retain qualified faculty. At Fairmont State University it usually can take 6 years to receive tenure. The process used by the College is to review faculty each year (i.e., teaching, scholarship, and service) to help keep the candidate on track. During the first year of employment, new faculty does not serve as advisors in a program of study.

E. Support of Faculty Professional Development

Describe the adequacy of support for faculty professional development, how such activities such as sabbaticals, travel, workshops, seminars, etc., are planned and supported.

As previously noted the College of Science and Technology provides professional development funds to support faculty and staff. No one has been turned down for the use of these funds in the past 6 years. Faculty can apply for sabbaticals, travel, workshops, and seminars on a regular basis. Sabbaticals are granted pending funding from existing budgets. Anyone holding faculty rank is eligible for sabbatical leave after the completion of at least six years of full-time employment at Fairmont State University. The award of sabbatical leave is not automatic, but depends on the merits of the request and on conditions prevailing at the University at the time. After completing a sabbatical leave, the individual will not again be eligible until the seventh subsequent year.

Sabbatical leave may be granted for the purpose of research, writing, study, or other activity designed to improve teaching and usefulness to the University. Applicants for sabbatical leave will initiate the procedure by obtaining application forms from their Deans. Applications will include: 1) personal professional data; 2) a typewritten proposal detailing the activity to be pursued; and 3) relevant supporting documents. Completed application forms will be submitted by applicants to their Deans on or before December 1 for a sabbatical leave to begin the fall or spring semester of the following academic year.

PROGRAM CRITERIA

Describe how the program satisfies any applicable program criteria. If already covered elsewhere in the self-study report, provide appropriate references.

[NOTE: It can be useful to list the program criteria requirements and then include a description or reference for how the program satisfies each of those requirements. The applicable program criteria could include statements that add specificity to the requirements for student outcomes found in Criterion 3. These statements differentiate the discipline designated by the program's title and should be included in the mapping to the program's student outcomes. The applicable program criteria could also include statements that add specificity to the curricular requirements found in Criterion 5 to differentiate the discipline implied by the title of the program criteria. These should be included in the program's required coursework.]

This section can consist of the listing of required topics and indicating which courses contain that content. The program should expect to provide examples of student work in each topic area to validate that the students are doing work related to each topic.

Other engineering experiences and opportunities

If a student qualifies for advanced mathematics (as determined through ACT and SAT test scores), they can be immediately enrolled into Calculus math courses and skip lower level math courses. The student can apply themselves in advanced mathematics or advanced technical courses as discussed with their advisor.

Also, ELEC 1199 and ELEC 4998 are special topic and research opportunities respectively open to students that excel academically. In these courses, special selected topics that are determined by the instructor and approved by the department chairperson. Credits earned will be applicable as free electives in degree and certificate programs. Also, various research topics used as experiential learning activity provide an opportunity for a student to engage in the scholarly activities of their major discipline under the guidance of a faculty mentor who will work in close partnership with each student in his or her formulation of a project, the development of a research strategy, and the assessment of a student's progress. The primary goal is for each student scholar to conduct an inquiry or investigation that makes an original, intellectual or creative contribution to their discipline and which is shared in an appropriate venue. Instructor approval required.

PROGRAM CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS

Curriculum

The Electronics Engineering Technology program at Fairmont State University prepares graduates to work in a wide variety of industries producing and/or using electrical and electronic equipment. Our instructional strategy is designed to produce graduates with knowledge, applied skills, and experiences in engineering technology, but also with problem solving, critical thinking, teamwork, and communication skills required by modern industries.

Graduates of the Electronics Engineering Technology Baccalaureate Level Program are exposed with a curriculum that prepares graduates with competence in the following areas:

a) the application of circuit analysis and design, computer programming, associated software, analog and digital electronics, and microcomputers, and engineering standards to the building, testing, operation, and maintenance of electrical/electronic(s) systems;

ELEC 1100 Circuit Analysis I and ELEC 2210 Circuit Analysis II provide a broad introduction to the concepts of voltage, current, resistance, capacitance and inductance. Also covered are Kirchhoff's Laws with applications in basic DC-AC, series-parallel circuits. Basic electromechanical devices and transformers as well as three phase electrical circuits are studied. The theory and applications of circuit analysis theorems, sinusoidal and non-sinusoidal waveforms, three-phase circuits and the use of computers in solving problems.

In the courses ELEC 2270 Introduction to Microcontroller Systems and ELEC 3310 Advanced Microcontroller systems provides the student with project-based learning using a multi-core microcontroller with A/D and D/A converters utilized and integrating an array of sensors, control high-speed stepper motors, and programming a mini robot to navigate autonomously. These courses provide experiences with multiple microcontrollers. The student develops competencies using a combination of hardware/software skills and problem solving abilities to create, control and monitor various embedded systems.

b) the application of natural sciences and mathematics at or above the level of algebra and trigonometry to the building, testing, operation, and maintenance of electrical/electronic systems;

ELEC 1100 Circuit Analysis I make use of algebra and trigonometry in AC circuits. ELEC 4410 Data Acquisition and Control Systems requires a knowledge of calculus for process control theory. Advanced mathematics are also used in ELEC 3360 Communication Systems.

c) the ability to analyze, design, and implement one or more of the following: control systems, instrumentation systems, communications systems, computer systems, or power systems;

ELEC 2240 Industrial Electronics, ELEC 2280 Programmable Controllers, and ELEC 4420 Advanced Automation Controller Systems cover programmable controllers and their application to sequential process control.

ELEC 3360 Communication Systems covers circuits and techniques to analyze AM, FM and digital communications systems. ELEC 1120 develops a strong competency to implement instrumentation systems. ELEC 2250 provides a strong and broad understanding of power systems.

d) the ability to apply project management techniques to electrical/electronic(s) systems;

ELEC 4401 Senior Electronics Project I and ELEC 4402 Senior Electronics Project II require the student to create, plan extensively covering the full semester, and executing the plan to achieve specific project goals and meet specific criteria within a specified timeframe. These attributes are the underpinning of project management applied to an electrical/electronic system.

e) the ability to utilize differential and integral calculus, as a minimum, to characterize the performance of electrical/electronic systems.

ELEC 3300 Advanced Linear Electronics covers signal conditioning circuits such as the integrator and differentiator. These circuits derive their names from their respective calculus functions. The integrator produces a voltage output proportional to the product of the input voltage and time; and the differentiator produces a voltage output proportional to the input voltage's rate of change. A knowledge and use of Calculus is required to understand systems using these techniques.

APPENDICES

APPENDIX A – COURSE SYLLABI

Please use the following format for the course syllabi (2 pages maximum in Times New Roman 12 point font)

1. Course number and name

2. Credits and contact hours

3. Instructor's or course coordinator's name

4. Text book, title, author, and year

   a. other supplemental materials

5. Specific course information

   a. brief description of the content of the course (catalog description)

   b. prerequisites or co-requisites

   c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

6. Specific goals for the course

   a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.

   b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

7. Brief list of topics to be covered

1) Course Name   Circuit Analysis I
Course Number: ELEC 1100

2) Lecture Information   3 credit hours
Location: 311 Engineering-Technology Building
Meeting day(s):   Wednesday (lecture, problem solving review, and testing)
Meeting time(s):   9:00 AM – 10:50 AM

3) Instructor Name   Mr. Thomas McLaughlin
Email: Thomas.McLaughlin@fairmontstate.edu
Office location: 403 ET Building
Office hours: Posted on office door or by appointment
Phone: (304) 367-4915

4) Required Textbook
Introductory Circuit Analysis, 13th Edition, Robert L. Boylestad **ISBN 978-0-13-392360-5**
Optional References: None
Other Tools/Supplies: Scientific Calculator
Software: None

5) Description: The student will be introduced to the concepts of voltage, current, power, resistance, capacitance, inductance, Ohm's and Kirchhoff's Laws with applications in basic and complex AC-DC series and parallel circuits, transformers and three phase power.
Course Pre-requisite(s): None
Course Co-requisite(s): MATH 1510 or better

6) Course Goals   At the end of this course, students will be able to:
1. Understand the use of Ohm's law involving current, voltage, and resistance.
2. Determine how to compute power consumed by various components.
3. Be able to perform circuit analysis on series and parallel circuits.
4. Understand the fundamentals of AC and DC circuits.

ABET Student Outcome:
  1. An ability to apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, or technology to solve broadly-defined engineering problems.

7) Topics Covered
I. Introduction – Chapter 1 Sections 1.3-1.11
    Units of Measurement
        Powers of Ten
II. Voltage and Current – Chapter 2 sections 2.1 – 2.10
        Atoms and their Structures, Voltage, Current
        Conductors and Insulators, Semiconductors
III. Resistance – Chapter 3 sections 3.1-3.14
        Resistance, Color Coding and Standard Resistor Values
        Conductance, Resistance
IV. Ohms Law Power and Energy - Chapter 4 sections 4.1—4.6
    Ohm's law, Power
V. Series DC circuits - Chapter 5 sections 5.1 – 5.8
        Series resistance, Series circuits
VI. Parallel DC Circuits - Chapter 6 sections 6.1 –6. 8
    Parallel resistance, Parallel circuits
VII. Series-Parallel Networks – Chapter 7 section 7.2
VIII. Chapter 13 sections 13.1 – 13.8
    Frequency Spectrum, Sinusoidal waveform
    Phase Relations, verage Value, Effective (rms) value
IX. The Basic Elements and Phasors - Chapter 14 sections 14.1-14.9
        Response of Basic R, L, and C Elements, Frequency Response of the Basic Elements
        Complex Numbers, Rectangular and Polar Forms and conversion between
        Mathematical Operations with Complex Numbers
XI. AC Power - Chapter 20 sections 20.1-20.9
        Resistive Circuit, Apparent Power, Inductive Circuit and Reactive Power
        Capacitive Circuit and Reactive Power, The Power Triangle
        The Total P, Q, and S, Power Factor Correction
XIII. Transformers and Three-Phase (Polyphase) Systems - Chapters 23 and 24
    A. Transformers (Chapter 23, sections 23.3 -23.4)
        Turns ratio, Voltage transformation, Current transformation, Reflected Impedance
    B. Three-Phase Intro (Chapter 24 sections 24.1-24.9) (High Level Overview)
        Wye configuration, currents and voltages,
            Delta configuration, currents and voltages

1) COURSE NAME: AC DC Electronics Analysis
   COURSE NUMBER: ELEC 1120

2) Lecture Information: 3 credit hours
Location: 307 Engineering Technology Building
Meeting day(s): M W
Meeting time(s): 9:00-10:50 AM

3) Instructor Name: Mr. Thomas McLaughlin
Email: Thomas.McLaughlin@fairmontstate.edu
Office location: 403ET Building
Office hours: Refer to Office Door Schedule or by appointment
Phone: (304) 367-4915

4) Required Textbook(s): None
Optional References: None
Required Other Tools/Supplies: (All these items can be purchased online or at Bookstore)
Prototyping Parts Kit 32BPPK Electronix Express
Powered Breadboard with LCD panel meter 03PBB509 Electronix Express
Electronix Express: Digital Multimeter (at Book store)
Learn to Solder Kit C6445 Chaney Electronics (stored in front of bookstore)
Deluxe SMD Learn to Solder Kit C6719 Chaney Electronics (stored in front of bookstore)

Tool Kit (not required, but available at bookstore)

Software: NI-Multisim is available in Labs 307 and 309, MS Office

4) **Course description:**
This course introduces the concepts of measuring voltage, current, and resistance after building various ac and dc circuits using discrete and integrated circuit components. The student will be introduced to circuit design and construction and learn to read a schematic diagram. The student will be familiarized with soldering components on surface mount and through-hole printed circuit boards. Different electronic instruments common in the laboratory; such as the digital multimeter (DMM), oscilloscope, function generator, and power supplies will be covered and utilized in a lab setting. The student will also learn to utilize simulation software and make comparisons between theoretical and real-world results. This course lays the foundation for all future lab courses.

Course Pre-requisite(s): None
Course Co-requisite(s): MATH 1510 or better
Delivery Method: The course takes place in an electronic laboratory setting. Blackboard will supplement course management.
Students will be required to access the course syllabus, assignments, and grades from Blackboard. The student is expected to purchase a number of kits and tools at the book store or online. The instructor can provide guidance about these purchases. The student will use these

items throughout their time at school. If you can't afford these items, contact the instructor who will attempt to find substitution components for this course.

6) Course outcomes: At the end of this course, students will be able to:

1. Master and apply learned knowledge, techniques, skills and modern tools of the electronics discipline including mathematics and science.
2. Develop the ability to read a schematic and build and test the circuit.
3. Be able to simulate electronic circuits using application software.
4. Prepare for the ability to engage in lifelong learning, a commitment to quality, timeliness, and continuous improvement
5. Solve circuit analysis problems utilizing mathematics and confirm results by building and testing the circuit using standard lab equipment.
6. An ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments.

ABET Student Outcomes: 4. An ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments.

7) Topics covered:
I. Schematic symbols and component identification
II. Resistors
III. Series, Parallel, Series-Parallel resistance circuits, Transistor circuits, Integrated Circuits and diode functionality
IV. Software Simulation and Schematic Capture
V. Oscilloscope and Function Generator
   A. Basic Operation and Controls
VI. Circuit boards
      A. Prototyping using breadboards
      B. Soldering
VII. Power supplies and meters
   A. DMM
   B. DC power supplies
   C. Capacitor Meter
VIII. Integrated Circuits
   A. Build and test a 555 timer circuit.

1) COURSE NAME: **Circuit Analysis II**
   COURSE NUMBER: **ELEC 2210**

2) Lecture Information: 3 credit hours
Location: 311 Engineering Technology Building
Meeting day(s):   T TR
Meeting time(s):   01:30 pm - 02:50 pm

3) Instructor Name: Mr. Thomas McLaughlin
Email: Thomas.McLaughlin@fairmontstate.edu
Office location: 403ET Building
Office hours: By appointment or refer to hours posted on office door
Phone: (304) 367-4915

4) Required Textbook:
Introductory Circuit Analysis, 13th Edition, Robert L. Boylestad, **ISBN 978-0-13-392360-5**

Optional References: None
Other Tools/Supplies: Scientific Calculator
Software: None

5) Course description: ELEC 2210 is the follow-up course of circuit analysis I. It consists of analyzing both AC and DC circuits using the three passive circuit elements of resistance, capacitance and inductance. Voltage current and power will be solved using a variety of methods. Frequency analysis of AC systems will also be investigated as well as three phase systems.

Course Pre-requisite(s):   ELEC 1100, MATH 1101 or better
Course Co-requisite(s): MATH 1102 or better
Delivery Method: The course will be delivered via traditional lecture and will be enhanced and managed on-line utilizing Blackboard. Students will be required to access the course enhancement tools to obtain the course syllabus, assignments, and grades for the course.

6) Course outcomes: At the end of this course, students will be able to:
   1. Solve circuits containing current sources and voltage sources.
   2. Determine if a bridge circuit is balanced.
   3. Analyze a DC circuit using Superposition, Thevenin's theorem and max power transfer.
   4. Solve simple RC and RL transient problems.
   5. Solve a sinusoid for amplitude, period, frequency, angular velocity, phase, radian, degrees, average and rms.
   6. Solve ac phasor problems for voltage and current in both polar and rectangular form using KCL and KVL.
   7. Solve for average power, power factor, and power factor correction in the basic elements using the power triangle.
   8. Solve for voltage, current, turns ratio, impedance, and impedance matching in simple transformers.
ABET Student Outcomes:

1. An ability to apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, or technology to solve broadly-defined engineering problems.
2. An ability to design solutions for well-defined technical problems and assist with engineering design of systems, components, or processes appropriate to the discipline.
3. An ability to apply written, oral, and graphical communication in well-defined technical and nontechnical environments; and an ability to identify and use appropriate technical literature.

7) Topics to be Covered:
III. Methods of dc analysis. Chapter 8 Sections 2, 3, 4, 11
       A. Current sources
           1. Source conversions
           2. Current sources in parallel
       B. Bridge networks
IV. Network theorems. Chapter 9 Sections 2, 3, 4
       A. Superposition theorem
       B. Thevenin's theorem
       C. Maximum power transfer theorem
V. Capacitors. Chapter 10 Sections 3, 5, 6, 11, 12
       A. Capacitance
           1. RC charge phase, RC discharge phase
           2. Capacitors in series and parallel
VI. Inductors. Chapter 11 Sections 5, 13
       A. Inductance
           1. RL storage phase
           2. RL release phase
VII. Sinusoidal alternating waveforms. Chapter 13 Sections 1, 2, 3, 4, 5, 6, 7, 8
       A. The Sinusoidal AC Voltage Characteristics/Definitions
VIII. The basic elements and phasors. Chapter 14 Sections 1, 2, 3, 4, 5, 6, 7, 8, 9
       A. Response of a Basic R, L, and C Elements to a Sinusoidal Voltage or Current
       B. Frequency Response of the Basic Elements
IX. Series ac circuits. Chapter 15 Sections 1, 2, 3, 4, 5, 6, 7, 8
       A. Resistive Elements
       B. Inductive Elements
       C. Capacitive Elements
X. Parallel ac circuits. Chapter 16 Sections 1, 2, 4
       A. Total Impedance
       B. Parallel ac Networks
XI. Series-parallel ac networks and the power triangle. Chapter 17 Sections 1, 2
       A. Illustrative Examples
XII. Power (ac).   Chapter 20   Sections 1, 2, 3, 4, 5, 6, 7, 8, 9
       A. Resistive Circuit, Apparent Power, Inductive Circuit and Reactive Power
D. The Power Triangle
XIII. Transformers. Chapter 23 Sections 1, 2, 3, 4,
XIV. Polyphase Systems. Chapter 24 Sections 1, 2, 3, 4, 5, 6, 7, 8, 9
       A. Three-Phase Systems (Delta and WYE)

1) COURSE NAME: Digital Electronics
    COURSE NUMBER: ELEC 2230
2) Lecture Information: 3 credit hours
Location: 313 Engineering Technology Building
Meeting day(s):   M W
Meeting time(s):   11:00-11:50 AM
Laboratory   Room 307 Engineering Technology Building - Thursday 9 – 10:50
3) Instructor Name: Mr. Thomas McLaughlin
Email: Thomas.McLaughlin@fairmontstate.edu
Office location: 403ET Building
Office hours: Refer to hours or by appointment
Phone: (304) 367-4915
4) Required Textbook(s):   Digital Systems Principles and Applications, 12th edition, Pearson, 2017, by Tocci, Widmer, and Moss
    ISBN 10: 0-13-422013-7 ISBN 13: 978-0-13-422013-0

Optional References: None
Other Tools/Supplies: Scientific Calculator, Parts Kit (In Bookstore)
Software: None
5) Course description: This course consists of digital systems, including such basic components as gates, flip-flops, and counters.
Course Pre-requisite(s): ELEC 1120, ELEC 2225
Course Co-requisite(s): NA
6) Course outcomes: At the end of this course, students will be able to:
1. Design logic circuits from Boolean expressions and analyze circuits to produce a Boolean expression.
2. Be able to design, build and test digital circuits.
3. Analyze and Design circuits with gates, flip flops, and counters.
4. Be able to apply the knowledge, techniques, skills, and modern tools of the discipline to narrowly defined engineering technology activities.
ABET Student Outcomes:
1. An ability to apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, or technology to solve broadly-defined engineering problems.
2. An ability to design solutions for well-defined technical problems and assist with engineering design of systems, components, or processes appropriate to the discipline.
7) Topics covered:
I. Chapter 1 sections 1 2 3 4 5 6 7
      A.Numerical Representations
      B. Digital And Analog Systems
      C. Digital Number Systems
      D. Representing Binary Quantities
II. Chapter 2 sections 1 2 3 4 5 6 7 8 9 10
      A. Binary-To-Decimal Conversions
      B. Decimal-To-Binary Conversions
      C. Hexadecimal Number System
      D. BCD Code
      E. The Gray Code

1) COURSE NAME: Microcontrollers
   COURSE NUMBER: ELEC 2270
2) Lecture Information: 3 credit hours
Location: 313 Engineering Technology Building
Meeting day(s):   W - F
Meeting time(s):   1:00-2:50 PM
Laboratory   Room 309 Engineering Technology Building
3) Instructor Name: Mr. Thomas McLaughlin
Email: Thomas.McLaughlin@fairmontstate.edu
Office location: 403ET Building
Office hours: Refer to hours schedule or by appointment
Phone: (304) 367-4915
Fax: (304) 367-4934
4) Required Textbook: NA
Optional References: None
Other Tools/Supplies: ActivityBot Robot Kit;   https://www.parallax.com/product/32500
Software: None
5) Course description: Project-based learning using a multi-core microcontroller with A/D and D/A converters utilized and integrating an array of sensors, control high-speed stepper motors, and program a mini robot to navigate autonomously.
Course Pre-requisite(s): ELEC 2230
Course Co-requisite(s): NA
Delivery Method: The course will be delivered with a combination of online tutorials, lectures, and hands-on lab projects.
6) Course outcomes: At the end of this course, students will be able to:
1. Program a multicore microcontroller using the C language.
2. Be able to design and build digital circuits to interact with the microcontroller.
3. Develop an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities.
ABET Student Outcomes:
   1. An ability to apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, or technology to solve broadly-defined engineering problems.
   2. An ability to design solutions for well-defined technical problems and assist with engineering design of systems, components, or processes appropriate to the discipline.
   3. An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature.
7) Topics covered:
I. C Language Tutorial (Complete Homework and Class Assignments)
   A. Variables and Math
   B. Floating Point Math
   C. Array Variables
   D. Make a Decision
   E. Make Several Decisions
   F. Make Complicated Decisions
   G. Code That Repeats

      H. Counting Loops

      I. Index Array Variables

      J. Variable Values and Addresses

      K. Get Values From Terminal

      L. Get Text from Terminal

II. Build Simple Circuits (Complete Homework and Class Assignments)

      A. Blink a Light

      B. Check Pushbuttons

      C. Piezo Beep

      D. Measure Volts

      E. Set Volts

      F. Sense Light

      G. Seven-Segment Display

      H. Learning to Control High Voltage Systems using a Microcontroller (Project)

III. Activity Bot Robot (Complete Homework and Class Assignments)

      A. Learn about the Multicore Microcontroller

      B. Mechanical Assembly of Activity Bot Robot

      C. Electrical Connections

      D. Software and Programming

      E. Circuit Practice and Introduction to Sensors

      F. Navigation Basics

      G. Navigate by Touch

      H. Navigate by Ultrasound

      I. Navigate by Visible Light

      J. Navigate by Infrared Flashlights

IV. Projects

      A. Create and Demonstrate a Microcontroller Project

      B. Create and Demonstrate an Activity Bot Project

      C. Develop and Present Project Reports

1) COURSE NAME: **Advanced Linear Electronics**
   COURSE NUMBER: **ELEC 3300**

2) Lecture Information: 3 credit hours
Location: Engineering Technology Building
Meeting day(s):   T Lecture Room 309 - TR Lab Room 307
Meeting time(s):   09:00 am - 10:50 am

3) Instructor Name: Mr. Thomas McLaughlin
Email: Thomas.McLaughlin@fairmontstate.edu
Office location: 403ET Building
Office hours: By appointment or refer to hours posted on office door
Phone: (304) 367-4915

4) Required Textbook(s):
Operational Amplifiers with Linear Integrated Circuits 4th edition by Stanley.
Publisher Prentice Hall ISBN 0-13-032013-7
Optional References: None
Other Tools/Supplies: Scientific Calculator, parts kit (see bookstore) and breadboard
Software: NI-MultiSim (available in Electronic Lab)

5) Course description: A study of linear devices including OP AMPS, comparators, voltage references, current references, filters, and timers. The course will include analysis and design concepts for the circuits studied.
Course Pre-requisite(s): ELEC 2225, ELEC 3360
Course Co-requisite(s): None

6) Course Outcomes: At the end of this course, students will be able to:
1. Solve for voltages and currents in the basic Op-Amp configurations.
2. Understand various types of OP AMP configurations (i.e. inverting, non-inverting, voltage follower, instrumentation, phase shift, etc.) and uses.
3. Design and build astable and monostable 555 circuits.
4. Solve precision rectifier, limiting, holding, and LM 317 problems.
5. Solve high pass, low pass, band pass and band reject filter problems.
6. Be able to work successfully as a team participant in a lab setting.

ABET Course Outcomes:
An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature.
An ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments.
An ability to function effectively as a member of a technical team.

7) Topics covered:
I. Chapter 2 sections 4, 8, 9, and 6
    A. Ideal Operational Amplifier

B. Linear Combination Circuit
C. Closed-Loop Differential Amplifier
D. Voltage-Controlled Current Sources
II. Chapter 5 sections 2, 7, and 8
A. Instrumentation Amplifier
B. Phase Shift Circuits
C. Single Power Supply Operation
III. Comparators Chapter 6 sections 1, 2, 3, 4 and 6
A. Input Voltage Considerations
B. Input-Output Characteristics
C. Open-Loop Comparators
D. LM311 Comparator
IV. Chapter 7 section 4
A. The 555 Timer
V. Chapter 8 (All sections)
A. Filter Classifications
B. Frequency and Impedance Scaling
C. Butterworth Filter Responses
D. Low-Pass and High-Pass Unity-Gain Designs
E. Low-Pass and High-Pass Equal-Component Designs
F. Two-Pole Band-Pass Response
G. State-Variable Filter
VI. Chapter 9 sections 2, 3, 5, 8
A. Signal-Processing Rectifier Circuits
B. Holding Circuits
C. Limiting Circuits
1. Op-Amp/Zener Limiter
2. Limiting Below a Reference Level
D. LM117/LM317 Regulators
1. Circuit Connection
2. Setting the Voltage

1) COURSE NAME: **Advanced Microcontroller Systems**
  COURSE NUMBER: **ELEC 3310**

2) Lecture Information: 3 credit hours
Location: Room 309 Engineering Technology Building
Meeting day(s): Tuesday and Thursday
Meeting time(s): 01:00 pm - 02:50 pm
3) Instructor Name: Mr. Thomas McLaughlin
Email: Thomas.McLaughlin@fairmontstate.edu
Office location: Room 403 ET Building
Office hours: Posted on office door or by appointment
Phone: (304) 367-4915
Fax: (304) 367-4934

4) Required Textbook(s): **Arduino Cookbook, 2nd Edition by Michael Margolis, ISBN: 978-1-449-31387-6**

Optional References: http://shop.oreilly.com/product/0636920022244.do
  Select on right side of page-> Download Example Code (for code examples from book)
Other Tools/Supplies: Arduino Uno Microcontroller
Software: Provided in lab 309

5) Course description: The student will develop a combination of hardware/software skills and problem solving abilities to create, control and monitor various systems. This course is structured similar to an engineering work environment. The student will be required to analyze and follow complex design techniques, write and compile software code and build interfacing circuitry to accomplish specific tasks. Students will follow lab procedures to perform assignments and develop more advanced projects from the knowledge gained. Group instruction will be provided to facilitate learning. At the end of this course the student will have experience with programming in C/C++ and developing embedded systems.

Course Pre-requisite(s): ELEC 2270
Course Co-requisite(s): NA
Delivery Method: The course will be delivered via lecture and hands-on lab assignments.

6) Course outcomes: At the end of this course, students will be able to:
1. Successfully interface the microcontroller with a circuit built on a breadboard, program code, compile and download to demonstrate operation of microcontroller/hardware circuitry.
2. Develop and modify existing computer code to demonstrate understanding of current lab.
3. Develop projects to demonstrate the use of a microcontroller to control and monitor an embedded process/system.
4. Effectively communicate (written and verbal) through project demonstration and presentation.

ABET Course outcomes:

1. An ability to apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, or technology to solve broadly-defined engineering problems.
2. An ability to design solutions for well-defined technical problems and assist with engineering design of systems, components, or processes appropriate to the discipline.
3. An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature.
4. An ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments.
5. An ability to function effectively as a member of a technical team.

7) Topics covered:
A. Serial communication (chapter 4)
    1. Microcontroller connectivity to other devices
B. Digital and Analog Input/Output (chapter 5)
        1. Reading/Writing digital and analog signals
C. Getting input from Sensors (chapter 6)
    1. Sense touch, sound, position, heat, and light.
D. Visual Output (chapter 7)
        1. Controlling displays
E. Physical Output (chapter 8)
    1. Utilizing solenoids, relays, stepper, servo, and DC motors.
F. Remotely Controlling Devices (chapter 10)
G. Using Displays (chapter 11)
H. Wireless Communication (chapter 14)
    1. ZIGBEE IEEE 802.15.4
I. Supplemental Tutorials: http://www.ladyada.net/learn/arduino/lesson0.html
                        https://www.arduino.cc/en/Tutorial/HomePage

1) COURSE NAME: **Senior Electronics Project II**
   COURSE NUMBER: **ELEC 4402**

2) Lecture Information: 3 credit hours
Location: Room 309 Engineering Technology Building
Meeting day(s):   Friday
Meeting time(s):   09:00 am - 11:50 am

3) Instructor Name: Mr. Thomas McLaughlin
Email: Thomas.McLaughlin@fairmontstate.edu
Office location: Room 403 ET Building
Office hours: Posted on office door or by appointment
Phone: (304) 367-4915
Fax: (304) 367-4934

4) Required Textbook(s):   None

References: To be provided
Other Tools/Supplies: MS Office Suite, NI-MultiSim
Software: Provided in lab 309

5) Course description: This is a writing intensive course requiring the student to develop numerous technical reports and papers. This course is also coordinated with the technical development within ELEC 4401 (Instructor-approved capstone project). While completing ELEC 4401 students will demonstrate, prepare and deliver an oral presentation, and submit a final report and presentation. Students will be required to visit and work with the Writing Center staff to improve their writing abilities and critical thinking skills in preparation for their respective careers.
Location: Jaynes Hall - Room 308, Monday - Friday: 9am - 4pm, (304) 333-3699.
Refer to: https://www.fairmontstate.edu/academics/tutoring-services

Course Pre-requisite(s): ENGL 1103 or better.
Course Co-requisite(s): ELEC 4401
Delivery Method: The course will be delivered via lecture and assignments.

6) Course outcomes: At the end of this course, students will be able to:
1. Participate actively in writing activities that model effective scientific and technical communication.
2. Understand how to apply technical information and knowledge in practical documents for a variety of audiences.
3. Learn and practice sentence conciseness, readability, clarity, accuracy, honesty, while avoiding wordiness and ambiguity.
4. Be able to manage, collect, analyze, document, and report research clearly, concisely, logically, and ethically.
5. Recognize and develop professional format features in print, using appropriate visual aids.

6. Develop professional work habits, including those necessary for effective collaboration and cooperation with others.
7. Develop good communications skills (written and verbal).

ABET Student Outcomes:
1. An ability to apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, or technology to solve broadly-defined engineering problems.
2. An ability to design solutions for well-defined technical problems and assist with engineering design of systems, components, or processes appropriate to the discipline.
3. An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature.

7) Topics covered:

I. Intensive Writing Techniques
        A. Resume Writing
        B. Cover Letters
        C. Interview Skills
        D. Online Presence and Social Media
        E. Technical Writing
        G. Report Writing
        H. Presentation Skills

II. Capstone Project
    A. Report
        B. Presentation

FAIRMONT STATE UNIVERSITY
DEPARTMENT: ENGINEERING TECHNOLOGY
PROGRAM: ELECTRONICS ENGINEERING TECHNOLOGY
COURSE TITLE: ELECTRONIC DEVICES
COURSE NUMBER: ELEC 2225
SEMESTER: SPRING 2019

Instructor Name: Assistant Professor **Musat Crihalmeanu** BSEE, MSEE, PE
Email: mcrihalmeanu@fairmontstate.edu
Office location: 410 ET Building
Office hours: See office door posting

Phone: (304) 367-4105
Communication with students: *If you need to contact the instructor outside of regular class time use the Fairmont State regular e-mail system. If the instructor needs to communicate with the entire class outside regular class time, it will be done through Blackboard. If the instructor needs to contact individuals, it will be done through the Fairmont State regular email system. All students should regularly check both systems for communications.*

Electronic Devices and Circuit Theory by Bolyestad and Nashelsky 11th edition. Pearson (Prentice Hall) Publishing.

Other Tools/Supplies: A simple scientific calculator such as one of the TI series or Casio fx-116MS, or any calculator permissible on the FE and PE exams.
   Note: During exams the use of sophisticated graphing and wi-fi calculators are prohibited!
 Lab kit. Digital voltmeter. Lab trainer. Various lengths of bread boarding wires. Solder gun. Alligator clips. Various sizes of resistors. Scope probes.
             Kit available at the bookstore

ELEC 2225 Electronic Devices :   3 credit hours; It is a required course **for the EE Program**
Devices studied will include diodes, transistors, Op Amps, and timers. The circuitry will include power supplies, basic amplifier types, power amplifiers, switching circuits, voltage regulators, comparators and active filters.
Prerequisites: ELEC 1120 (Instrumentation Lab / AC/DC Electronics Analysis), ELEC 1100 (CA1).
Co-Requisites: ELEC 2210(CA2), MATH 1102 (Applied Tech. Math2) or ACT 24

Course Topics Outline
Diodes
Diode Types and Characteristics
Diode Applications
Bipolar Junction Transistors
Bipolar Junction Transistors
DC Biasing-BJT's

Field-Effect Transistors
JFET
MOSFET depletion and enhancement

Power Amplifiers , classes

Operational Amplifiers
Operational Amplifiers
Op-Amp Applications

Comparators
Linear-Digital ICs
Comparators

Timers
 Timer Operation
The 555 IC timer

Grading	Weight of Assignments in the grade
90-100 = A	**Homework (20%)**
80-89 = B	**Tests (20%)**
70-79 = C	**Labs (40%)**
60-69 = D	**Comprehensive Final Exam (20%)**
59 and below = F	

Goals of this course

At the end of this course, the student should be capable of understanding the use of diodes, BJTs, JFETs, MOSFETs, OpAmps and timer 555. Due to the Lab section of the course, the students will enhance their instrumentation knowledge (oscilloscopes, power supplies, function generators and breadvoards) and their circuit troubleshooting knowledge. The students should be able to understand and use Data-Sheet information, Maximum Absolute ratings and Electrical Characteristics.

Course Outcomes from *Criterion 3:*
1. Ability to apply knowledge, techniques, skills, and modern tools of Math, Science, Engineering, or Technology to solve broadly-defined engineering problems. (a, b, f)
4. Ability to conduct standard tests and measurements, and to conduct, analyze and interpret experiments (e).
5. Ability to function effectively as a member of a technical team (also e).

FAIRMONT STATE UNIVERSITY
DEPARTMENT: TECHNOLOGY
PROGRAM: ELECTRONICS ENGINEERING TECHNOLOGY
COURSE TITLE: INDUSTRIAL ELECTRONICS
COURSE NUMBER: ELEC 2240
SEMESTER: SPRING 2019

Course Information
Course description: ELEC 2240 is a lecture and "hands-on" lab-based course designed to instruct students in the operation of industrial power and control systems. A systems approach of many devices studied in earlier coursework (as well as non-familiar devices) will be encountered.

Course Pre-requisite(s):   ELEC 2210 CA II, ELEC 2225 El. Devices, ELEC 2230 Digital El.
Course Co-requisite(s):

Delivery Method: The course will be a combination of classroom lecture and supporting laboratory experiments. The course will be supplemented through the use of Blackboard to post assignments and grades.

Lecture Information: 3 credit hours
Location: Room 311 ET (Engineering Technology Building)
Meeting day(s):   Monday, Friday
Meeting time(s):   9:00-9:50 AM

Laboratory Information: The credit for the lab is included in the 3 hour lecture credit.
Location: Room 307 ET
Meeting day(s):   Wednesday
Meeting time(s):   9:00 AM-10:50 PM

Instructor Information
Instructor Name: Musat Crihalmeanu
Email: mcrihalmeanu@fairmontstate.edu
Office location: 410 ET Building
Office hours: See office door posting

Phone: (304) 367-4105

Required Course Materials
Required Textbook(s):
Industrial Electronics by Humphries and Sheets 4th edition. Delmar Publications (Cengage Learning)
ISBN13: 978-0827358256
ISBN10: 0827358253

Other Tools/Supplies: A good scientific calculator such as the TI-89 series. Also consider a HP 33s which is a very capable calculator and is permissible on the FE and PE exams. Lab kit for purchase at the book store. Check the bookstore for the current price. Digital voltmeter. Lab trainer. Various lengths of bread boarding wires. Solder gun. Alligator clips. Various sizes of resistors. Scope probes.

Software: Multisim, Excel, Word, internet capability.

Course Outline and Tentative Schedule of Topics

Outline and Tentative Schedule of

I. Operational Amplifiers for Industrial Applications - Chapter 1
        A. Instrumentation Amplifier
        B. Logarithmic Amplifier
        C. Miscellaneous Op Amp Applications
        D. Current-Differencing Amplifier
        E. Operational Transconductance Amplifier

II. Linear Integrated Circuits for Industrial Applications – Chapter 2
        A. Voltage-to-Frequency (V/F) Conversion
        B. Phase-Locked Loops
        C. Frequency-to-Voltage (F/V) Conversion
        D. Digital-to-Analog (D/A) Conversion
        E. Analog-to-Digital (A/D) Conversion

III. Brushless and Stepper DC Motors – Chapter 4
        A. Stepper Motors
        B. Optical Encoders

V. Transducers – Chapter 8
        A. Temperature
VII. Pulse Modulation – Chapter 11
        A. The LM555 Timer

Student outcomes
At the end of this course the student should be able to understand and use opamps for industrial applications, special ICs like VCOs, PLLs, CDAs and OPAs. They should enhance their motors knowledge with steppers and brushless motors and their specifics and ways to control them.

Specific outcomes from Criterion 3:
1. Ability to apply knowledge, techniques, skills, and modern tools of Math, Science, Engineering, or Technology to solve broadly-defined engineering problems. [a, b, f]
3. An ability to apply written, oral, and graphical communication in well-defined technical and nontechnical environment; and an ability to identify and use appropriate technical literature.
4. Ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments. [e]
5. Ability to function effectively as a member of a technical team. [e].

FAIRMONT STATE UNIVERSITY
DEPARTMENT: ENGINEERING TECHNOLOGY
PROGRAM: ELECTRONICS TECHNOLOGY
COURSE TITLE: AC/DC MACHINERY
COURSE NUMBER: ELEC 2250
SEMESTER: SPRING 2019

Course Information

Course description: Study of the basic concepts of rotating machinery and transformers

Course Pre-requisite(s):   ELEC 1100 CA1, ELEC 2100 CA2, MATH 1520. No co-requisites.
Delivery Method: The course will be a combination of classroom lecture and supporting
laboratory experiments. The course will be supplemented using Blackboard to post some of the
assignments and grades.
Lecture Information: 3 credit hours
Location: 311 Engineering Technology Building (ET)
Meeting day(s):   T, R
Meeting time(s):   10:00-10:50 AM
Laboratory Information: The credit for the lab is included in the 3-hour lecture credit.
Location: 311 ET
Meeting day(s):   F
Meeting time(s):   10:00 AM-12:00 PM (Noon)

Instructor Information
Instructor Name: Assistant Professor Musat Crihalmeanu, PE, BSEE, MSEE.
Email: mcrihalmeanu@fairmontstate.edu
Office location: 410 ET Building
Office hours: See office door posting
Phone: (304) 367- 4105

Required Textbook(s):
        Electric Machines: Theory, Operation, Applications, Adjustment, and Control 2nd
edition by Hubert, ISBN: 9780130612106, $81.00 to $218.00.
Software: Software: Multisim, Excel, Word, internet capability.

Course Outline Chapter 1 sections 2 3 4 5 6 7 8 9 10 11 12 15
        A. Magnetic Field
        B. Magnetic Circuit Defined
        C. Reluctance and the Magnetic Circuit Equation
        D. Relative Permeability and Magnetization Curves
        F. Magnetic Hysteresis and Hysteresis Loss
        G. Interaction of Magnetic Fields (Motor Action)
        H. Elementary Two-Pole Motor
        K. Elementary two-Pole Generator

II. Chapter 2 sections 2 3 4 5 8 11 13 14
      B. Principle of Transformer Action
      D. No-Load Conditions
      E. Ideal Transformer
      G. Transformer Losses and Efficiency
      H. Determination of Transformer Parameters

IV. Chapter 4 sections 2 3 5 7 8 11 12 15
      A. Induction-Motor Action
           B. Reversal of Rotation
           C. Synchronous Speed
           D. Slip and its Effect on Rotor Frequency and Voltage
           E. Equivalent Circuit of an Induction-Motor Rotor
           F. Mechanical Power and Developed Torque
           G. Torque-Speed Characteristic

      VII. Chapter 7 section 6
           H. Basic DC Motor

Student Grade Scale
A: 90%-100%   Benchmark: Professional
B: 80%-89.9%   Benchmark: Target
C: 70%-79.9%   Benchmark: Target
D: 60%-69.9%   Benchmark: Substandard
F : <60%   Benchmark: Substandard

Student Grade Distribution   Assignments weight on final grade
90-100 = A   Homework (25%)
80-89   = B   Labs (40%)
70-79   = C   Tests (20%)
60-69   = D   Comprehensive Final (15%)
59 and below = F

Student Outcomes for ELEC 2250 AC/DC Machinery

At the end of this course the student should be able to understand electromagnetism concepts like Magneto-Motive Force, Reluctance, Magnetic Flux, Magnetic Flux Intensity, Magnetic Flux Density, Hysteresis. Broad understanding of Transformers, AC Induction Motors is expected and basic introductory concepts of DC Motors.

Student Outcomes based on ABET Criterion #3:
1. Ability to apply knowledge, techniques, skills, and modern tools of Math, Science, Engineering, or Technology to solve broadly-defined engineering problems. [a,b,f]
4. Ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments. [e]
5. Ability to function effectively as a member of a technical team. [e]

1) COURSE NAME: PROGRAMMABLE CONTROLLERS
   COURSE NUMBER: ELEC 2280
2) Lecture Information: 3 credit hours
Location: Room 309 Engineering Technology Building
Meeting day(s):   T, R
Meeting time(s):   1:30 - 3:30 PM
3) Instructor Name: Musat Crihalmeanu BSEE, MSEE, PE
Email: mcrihalmeanu@fairmontstate.edu
Office location: 410 ET Building
Office hours: See office door
Phone: (304) 367-4105
Fax: (304) 367-4934
4) Required Textbook(s):
Frank D. Petruzella
 PROGRAMMABLE LOGIC CONTROLLERS
5th edition, McGraw Hill, 2016.
ISBN 978-0-07-337384-3
Optional References:
Frank D. Petruzella – ELECTRIC MOTORS CONTROL SYSTEMS
2nd edition, McGraw Hill, 2016

Other Tools/Supplies: Scientific Calculator (TI series, HP 33s), CASIO fx 116 series
                     .
Software: LogixPro simulation, SIEMENS S7-1200 TIA Portal,
                           Allen Bradley RS Logix 500, Factory talk View, STUDIO 5000.

5) Course description: Introduction to Programmable Logic Controllers. General concepts
about PLC's hardware and software. The course is designed for students with no prior PLC
experience.
Course Pre-requisite(s): ELEC 2230 Digital Electronics and ELEC 2250 AC/DC Machines

6) Course outcomes: At the end of this course, students will be able to:
-    Understand the parts of a PLC and their purposes.
-    Learn about Ladder Logic and how to apply it to control systems.
-    Wire PLCs to common input and output devices.
-    Program PLCs using instructions such as Timers, Counters, Math Instructions, etc..
-    Using Analog signals with a PLC.
-   Converting Relay Schematics into PLC Ladder Programs.
-   Writing a Ladder Logic directly from a Narrative Description
-   Learn LogixPro simulation software
-   Accomplish simple projects using Allen Bradley Micrologix and Siemens S7-1200 PLCs.
7) Course Outline and Tentative schedule of Topics :
I. Chapter1 PLCs – An Overview

II. Chapter 2 PLC Hardware Components

III. Chapter 4 Fundamentals of Logic

IV. Chapter 5 Basics of PLC Programming

VI. Chapter 7 Programming Timers

VII. Chapter 8 Programming Counters

VIII. Chapter 9 Program Control Instructions

IX. Chapter 10 Data Manipulation Instructions

 X. Chapter 11 Math Instructions

XI. Chapter 13 PLC Installation Practices, Editing, and Troubleshooting

8) Student Grade Scale and other information:

Grade Scale

Grades are comprised of:
Weight (%)   , Tentative Dates

A: 90%-100%   Homework and Class Assignments, Quizzes   25 TBA
B: 80%-89.9%   Laboratory, Projects   30 TBA
C: 70%-79.9%   Test 1, Test 2 25 TBA
D: 60%-69.9%   Comprehensive Final TBA
F: <60%

Student Outcomes according to ABET Criterion #3:

1. Ability to apply knowledge, techniques, skills, and modern tools of Math, Science,
Engineering, or Technology to solve broadly-defined engineering problems. [a,b,f]
4. Ability to conduct standard tests and measurements, and to conduct, analyze, and interpret
experiments. [e]
5. Ability to function effectively as a member of a technical team. [e]

1) COURSE NAME: MODERN ELECTRONIC COMMUNICATION
COURSE NUMBER: ELEC 3360
2) Lecture Information: 3 credit hours
Location: 311 Engineering Technology Building (lecture); 307 ET for Lab.
Meeting day(s):   Lecture: MW; Lab: F
Meeting time(s):   Lecture: 8:00 – 9:00AM, Lab: 8:00 – 10:00AM
3) Instructor Name: Musat Crihalmeanu
Email: mcrihalmeanu@fairmontstate.edu
Office location: 410 ET Building
Office hours: M, F: 11:00AM – 1:00PM; T, TR: 2:30PM – 4:00PM
Phone: (304) 367-4105
4) a) Required Textbook(s):
Jeffrey S. Beasley, Garry M. Miller
 MODERN ELECTRONIC COMMUNICATION
9th edition, PEARSON Prentice Hall, 2008. ISBN 13: 978-0-13-22511

4) b) Optional Textbook:
Louis Frenzel Jr.
PRINCIPLES OF ELECTRONIC COMMUNICATION SYSTEMS
4th edition, MCGRAW-HILL, 2016, ISBN 978-0-07-337385-0

Software: Multisim 2016, Excel, Word.
5) Course description: ELEC 3360 is a lecture & lab based course designed to provide
students   with the basic concepts of communication theory. This
includes
                             Techniques such as Amplitude, Frequency, and Pulse Modulation.
                             An introduction to Digital Communication will also be included.
                             Many different electronic devices will be used in the lab to
                             implement these techniques.
Course Pre-requisite(s):   ELEC 2230 Digital Electronics
                             ELEC 2225 Electronic Devices (or better: ELEC 3300 Adv. Linear
El.)
6) Course Outline and Tentative schedule of Topics :
I. Introductory Topics – Chapter 1 sections 1- 4, 6-8
        A. Introduction
        B. The dB in Communications
        D. Noise Designation and Calculation
        E. Information and Bandwidth
        F. LC Circuits
        G. Oscillators
II. Amplitude Modulation – Transmission
        A. Introduction
        B. AM fundamentals
        C. Percentage modulation
        D. AM Analysis
III.A. Amplitude Modulation – Reception – Chapter 3 sections 2 - 5

A. AM Detection
B. Superheterodyne Receivers
D. Superheterodyne Analysis
III.B. Frequency Modulation – Transmission – Chapter 5 sections 1 2 3 5 7
A. Angle Modulation
B. Simple FM Generator
C. FM Analysis
D. Direct FM Generation
IV. Frequency Modulation – Reception – Chapter 6 section 5
A. Phase - Locked Loop
V. Digital Communications – Coding Techniques – Chapter 8 sections 3 4
A. Pulse-Code Modulation
B. Digital Signal Encoding Formats

Grade Scale and assignments weight in final grade Information:

Grade Scale
Grades are comprised of:
Weight (%)   , Tentative Dates

A: 90%-100%   Homework and Class Assignments , Quizzes20 TBA
B: 80%-89.9%   Laboratory 40TBA
C: 70%-79.9%   Test 1, Test 2 20   TBA
D: 60%-69.9%   Comprehensive Final 20 TBA
F : <60%

Student Outcomes:
At the end of this course the student will understand concepts like: noise, oscillators, modulation, AM, FM, PM and basic Digital Modulation.

Student Outcomes conform ABET Criterion #3:
1. Ability to apply knowledge, techniques, skills, and modern tools of Math, Science, Engineering, or Technology to solve broadly-defined engineering problems. [a,b,f]
4. Ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments. [e]

FAIRMONT STATE UNIVERSITY
DEPARTMENT: ENGINEERING TECHNOLOGY
PROGRAM:ELECTRONICS TECHNOLOGY
COURSE TITLE: SENIOR PROJECT I (Hardware/Software/Build)
COURSE NUMBER: ELEC 4401
SEMESTER: SPRING 2019

Course Information

Course description: This is an instructor approved project course, integrating concepts from previous courses. This course will allow the student to pursue specialized interests and show competence to complete an individual project. This is a capstone course in ELEC and requires programming to receive credit. Baccalaureate majors only. This course works in conjunction with ELEC 4402 which is the documentation portion of the project.

Course Pre-requisite(s):   ELEC 2270 Intro to Micro, ELEC 2240 Industrial El., ELEC 2280 PLC, ELEC 3300 Adv. Linear, ELEC 3360 El. Communications.
Course Co-requisite(s):   ELEC 4402

Delivery Method: The course is an independent study course, requiring students to design, build, and demonstrate a project. The class will meet once a week.
Credit hour Information: 4 credit hours
Location: Room 309 Engineering Technology Building
Meeting day(s):   Monday
Meeting time(s):   1:00-4:00 PM

Instructor Information

    Instructor Name: Musat Crihalmeanu, PE; BSEE, MSEE
    Email: mcrihalmeanu@fairmontstate.edu
    Office location: 410 ET
    Office hours: Check Office Door Posting
    Phone: 304-367-4105

Other Tools/Supplies: Digital voltmeter. Lab trainer. Various lengths of bread boarding wires. Solder gun. Alligator clips. Various sizes of resistors. Scope probes. Microcontoller(s).
Software: Multisim, Excel, Word, Visio, XCTU, Arduino C, Spin, Python, PLC ladder logic and HMI software
Course outline:
Session 1: Mon. Jan. 14;
1. Review course syllabus
    2. Research possible project ideas.
    3. Select possible project(s)

    Session 2: Mon. Jan. 28;
    1. Narrow choice to a single project.

2. Sketch a block diagram of the project.
3. Make up a parts order list.
4. Submit parts order.

Session 3: Mon. Feb. 4;
    1. Sketch a schematic of the project.
    2. Sketch a wiring diagram of the project.

Session 4: Mon. Feb. 11;
1. Begin project build by assembling components.

Session 5: Mon. Feb. 18;
1. Begin wiring the project.

Session 6. Mon. Feb.25;
2. Begin hardware testing.

Session 7. Mon. March 4;
1. Begin writing program code.
Session 8. Mon. March 11;
1. Begin debugging program code.

Sessions 9 through 15. Mon. Mar. 18 through Apr. 29
Hardware/Software debugging. Final assembly. Tidy up the wiring.

Students enrolled in the Department of Technology programs at Fairmont State University will primarily be concerned with applying established scientific and engineering knowledge and methods combined with technical skills in support of engineering activities.

Student Outcomes Criterion#3:
1. Ability to apply knowledge, techniques, skills, and modern tools of Math, Science, Engineering, or technology to solve broadly-defined engineering problems. [a,b,f]
2. Ability to design solutions for well-defined technical problems and assist with engineering design of systems, components, or processes, appropriate to the discipline. [d]

1) COURSE NAME: DATA ACQUISITION AND CONTROL
    COURSE NUMBER: ELEC 4410

2) Lecture Information: 4 credit hours
Location: 309 Engineering Technology Building
Meeting day(s):   Lecture: T, R; Lab: M
Meeting time(s):   Lecture: 1:30-2:30 PM; Lab: 3:00 – 5:30 PM
3) Instructor Name: Musat Crihalmeanu, BSEE, MSEE, PE
Email: mcrihalmeanu@fairmontstate.edu
Office location: 410 ET Building
Office hours: M , F: 11:00AM – 1:00PM; T, TR: 2:30PM – 4:00PM
Phone: (304) 367-4105
4) Required Textbook(s):
Curtis D. Johnson
 PROCESS CONTROL INSTRUMENTATION TECHNOLOGY
8th edition, PEARSON Prentice Hall, 2006.
ISBN 0-13-119457-7
Optional References:
Christopher T. Kilian – MODERN CONTROL TECHNOLOGY
3rd edition, Thomson Delmar Learning

Software: National Instruments, Labview 2011, Multisim 2016, Excel, Word.
5) Course description: Theory and use of Data Acquisition and Control Systems,
including transducers, signal conditioning circuits, multiplexing, A/D and D/A converters,
computers and control devices.
Course Pre-requisite(s):   Baccalaureate majors only. ELEC 2240 Industrial Electronics and
                            ELEC 3300 Advanced Linear Electronics

6) Course outcomes: At the end of this course, students will be able to:
1.   Understand basic principles of engineering control.
2.   Learn and identify the main elements of a Process-Control System.
3.   Learn about the Control System Evaluation.
4.   Understand Analog and Digital Processing and Data Representation.
5.   Learn basic principles of Analog Signal Conditioning
6.   Learn about temperature sensors and their principles.
7.   Learn about displacement sensors and their principles.
8.   Understand the Final Control Operation, Control Element and Actuators.
9.   Get some theoretical and practical knowledge about the PID, PI, PD and P loops.
10. Learn to use Labview Software at a beginner-to-intermediate level.

7) Course Outline and Tentative schedule of Topics :
I. Chapter1 sections 1-8
A.Control Systems
B. Process-Control Block Diagram
C. Control System Evaluation
D. Analog And Digital Processing
E. Units, Standards, and Definitions

F. Sensor Time Response
G. Significance and Statistics

 II. Chapter 2 sections 1 – 3, 5
A. Principles of Analog Signal Conditioning
B. Passive Circuits

III. Chapter 4 section 1- 7
A.Definition of Temperature
B. Metal Resistance Versus Temperature Devices
C. Thermistors
D. Thermocouples
E. Other Thermal Sensors
F. Design Considerations

IV. Chapter 5 sections 1, 2, 3, 5,6

8) Grade Information:

Grade Scale

Grades are comprised of:
Weight (%)   , Tentative Dates

A: 90%-100%   Homework and Class Assignments , Quizzes   20 TBA
B: 80%-89.9%   Laboratory   35 TBA
C: 70%-79.9%   Test 1, Test 2, Test 3 (?)   25 TBA
D: 60%-69.9%   Comprehensive Final 20 May 14, 2015,
1:00 – 3:00 PM
F: < 60%

Student Outcomes conform with Criterion #3:

1. Ability to apply knowledge, techniques, skills, and modern tools of Math, Science, Engineering, or Technology to solve broadly-defined engineering problems. [a,b,f]
2. An ability to design solutions for well-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline.

    4   Ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments. [e]

1) Course Name: ADVANCED AUTOMATION CONCEPTS
   Course Number: ELEC 4420
2) Lecture Information: 3 credit hours
Location: 309 Engineering Technology Building
Meeting day(s):   T TR
Meeting time(s):   10:00-Noon
3) Instructor Name: Musat Crihalmeanu BSEE, MSEE, PE
Email: mcrihalmeanu@fairmontstate.edu
Office location: 410 ET Building
Office hours: Monday: 11:00AM – 1:00PM; T, TR: 2:30PM – 4:30PM
Phone: (304) 367-4105
4) Required Textbook(s):

Frank D. Petruzella
ELECTRIC MOTORS CONTROL SYSTEMS, 2nd edition, McGraw Hill, 2016

Software: LogixPro simulation, SIEMENS S7-1200 TIA Portal Basic, Allen
                       Bradley,RS Logix 500, Factory talk View, STUDIO 5000.

5) Course description: Advanced PLC concepts. Multi-platform knowledge. AC induction
Motor review. VFD fundamentals. Motion in one axis. This course is designed for students with
prior PLC experience.
Course Pre-requisite(s): ELEC 2280 - Introduction to PLC, ELEC 2250- AC/DC Machines

6) Course outcomes: At the end of this course, students will be able to:
1. Understand Safety in the Workplace
2. Review fundamentals on two PLC platforms: Allen Bradley and Siemens.
3. Learn more on Motor Control Devices: Switches, Relays, Sensors, Actuators, Servos
4. Understand the Power Electronics in Adjustable Speed Motor Drives.
5. Learn basics of Motor Drives (VFDs).
6. Use Analog signals with a PLC.
7. Understand motion in one axis, get familiar with Kinetix300 VFD and the TLY Series AC
induction servo.
7. Accomplish simple projects using Allen Bradley Micrologix, Compact Logix, Kinetix300
and Siemens S7-1200 PLCs.

7) Course Outline and Tentative schedule of Topics :

I.   Chapter1   Safety in the Workplace

II.   Chapter 3   Transformers and distribution systems:

III. Chapter 4   Motor Control Devices

IV. Chapter 5   Electric Motors (review)

V. Chapter 6   Contactors and Motor Starters

VI. Chapter 9   Motor Control Electronics

VII. Chapter 10 Adjustable-Speed Drives and PLC Installation

Practical Assignments

Practical lab experiments will be provided in controller applications – culminating with several projects. The projects will be the result of a team work, but each student must submit their own project report in the form of a printed electrical schematic with explanations, and printed Ladder Logic and /or HMI with explanations. One member of each team will give a Power Point Presentation on how the project was accomplished, per the instructor's request.

8) Grade Information:

Grade Scale

Grades are comprised of:
Weight (%)   , Tentative Dates

A: 90%-100%   Homework and Class Assignments , Quizzes   20 TBA
B: 80%-89.9%   Laboratory, Projects   35 TBA
C: 70%-79.9%   Test 1, Test 2 25 TBA
D: 60%-69.9%   Comprehensive Final 20 TBD
F : <60%

ABET Criterion #3 Student Outcomes related to ELEC 4420:

1. Ability to apply knowledge, techniques, skills, and modern tools of Math, Science, Engineering, or Technology to solve broadly-defined engineering problems. [a,b,f]

2. Ability to design solutions for well-defined technical problems and assist with engineering design of systems, components, or processes appropriate to the discipline. [d]

    4 An ability to function effectively as a member of a technical team.

APPENDIX B – FACULTY VITAE

Please use the following format for the faculty vitae (2 pages maximum in Times New Roman 12 point type)

1. Name

2. Education – degree, discipline, institution, year

3. Academic experience – institution, rank, title (chair, coordinator, etc. if appropriate), when (ex. 1990-1995), full time or part time

4. Non-academic experience – company or entity, title, brief description of position, when (ex. 1993-1999), full time or part time

5. Certifications or professional registrations

6. Current membership in professional organizations

7. Honors and awards

8. Service activities (within and outside of the institution)

9. Briefly list the most important publications and presentations from the past five years – title, co-authors if any, where published and/or presented, date of publication or presentation

10. Briefly list the most recent professional development activities

1. **Thomas M. McLaughlin, Assistant Professor of Electronics Engineering Technology**

2. **Education:**
   - Master of Science, Electrical Engineering (Digital Electronics Focus), Johns Hopkins University, May 1999
   - Bachelor of Science, Electrical Engineering, West Virginia University, May 1987

3. **Academic experience:**
   - Fairmont State University - Electronics Engineering Technology
     Assistant Professor – 2014 to Present

4. **Non-academic experience:**
   - 2008 – 2014 Lockheed Martin Corporation, Systems Engineer Sr.; White Hall, WV
     - Collaborated to conduct an engineering study to analyze and choose a search platform for integration into a Department of Justice information exchange system (OneDOJ). Assisted to develop a Proof of Concept (POC) evaluation methodology to meet customer requirements and facilitate the team into selecting the best product for a specific application.
   - 2000 – 2008 WV High Technology Foundation, Project Manager; Fairmont, WV
     - Participant in the Department of Justice (DOJ) - National Institute of Justice (NIJ) Communication Technology (CommTech) Technology Working Group (TWG) and Biometrics TWG.
   - 1998 – 2000 - National Security Agency, Information System Security Engineer, Fort Meade, MD
     - Provided Information System Security Engineering (ISSE) guidance, services, identified security solutions and security awareness related to system architecture and data transport protocols. Duties included customer support within the intelligence community and across the Defense Information Infrastructure (DII).
   - 1996 – 1998 - Northrop Grumman Corporation, Electrical Engineer, Baltimore, MD
     - Responsible for the hardware/firmware upgrade (FPGAs and EEPROMs), prototype, and acceptance testing of a Graphics Card used to drive flat panel displays. Author of the Graphics Card Design Document, User's Guide, and Technical Manual.
   - 1987 – 1996 Westinghouse Electric Corporation, Associate Engineer, Baltimore, MD
     - Conducted extensive maintenance training courses for customers world-wide in support of the ALQ-131 Electronic Countermeasure Pod for the Israeli AF, Royal Netherlands AF, Portuguese AF, Japanese Defense Force, Bahrain AF, and the Egyptian AF.

5. **Certifications or professional registrations:**
   - None

6. **Current membership in professional organizations:**
   - None

7. **Honors and awards:**
   - Lockheed Martin Corporation Special Recognition Award (2013) for Critical Design Review and the Team Excellence Award for outstanding performance and lasting contribution for the Next Gen Identification System delivered to FBI.
   - NSA Achievement Award (1998) for significant and outstanding contribution for the ATM Risk Assessment Report and follow-on briefings.
   - Westinghouse Electric Corp. Service Excellence Award (1989, 1990) for conducting outstanding customer training for Support of ALQ-131 System.

8. **Service activities: (within and outside of the institution)**
   - FSU College of Science and Technology Faculty Senate
   - Lions Club International

9. **Briefly list the most important publications and presentations from the past five years – title, co-authors if any, where published and/or presented, date of publication or presentation.**
   - None

10. **Briefly list the most recent professional development activities**
- Developed Course material and incorporated into the EET curriculum (ELEC 3310), advanced microcontroller training using single and multicore processors.
- ABET Continuous Improvement Workshop, October 2018

1. **Musat C. Crihalmeanu**, Assistant Professor of Electronics Engineering Technology
2. **Education**:

   Master of Science in Electrical Engineering, West Virginia University, 2003.
   Bachelor of Science in Electrical Engineering, Technical University of Cluj-Napoca, Romania, 1984.

3. **Academic Experience:**

   West Virginia University, Teaching Assistant, 2002-2003.
   West Virginia University, Instrumentation Laboratory for Civil and MAE Dept. 2005-2006
   West Virginia University, Research Engineering Scientist, 2004-2006.
   Fairmont State University, Assistant Professor of Electronics Technology, 2015 – Present.

4. **Non-Academic Experience:**

   ElectroSigma S.A. Cluj-Napoca, Electrical Design Engineer, 1984 – 1994.
   KD Yang Cluj-Napoca, Service and Assembly Engineer 1994-1996.
   KD Yang Cluj-Napoca, Technical Manager, 1996-1998.
   3D-Computer Cluj-Napoca, Service Manager, 1998-2000.
   Lotus International, Detroit, MI, Technical Specialist, 2000-2001.
   HSC Industrial Beckley, WV, Research and Development Engineer, 2006-2010.
   Doddridge Controls Inc., Fairmont, WV, Design Electrical Engineer, 2010-2013.
   EarthRes Group, Morgantown, WV, Electrical Engineer – Contractor, 2014.
   HSC Industrial Beckley, Electrical Design Engineer – Contractor, 2015.

5. **Certifications or Professional registrations:**

   Registered Professional Engineer for Electrical and Electronics for the state of WV-2009.
   Registered Professional Engineer for Electrical and Electronics for the Commonwealth of PA – 2014.

6. **Current membership in professional organizations:**

   FSU Robotics Club – "Full Metal Falcons", co-founder.
   "Solar Army" – member

7. **Honors and awards:**

   None
8. **Service activities: (within and outside of the institution)**

   None

9. **Most important publications and presentations from past five years – title, co-authors if any, where published and / or presented, date of publication or presentation:**
   - Technical Report for the NASA Grant 2016, "Development of a Hybrid 3D printing and CNC Machine", together with student David Klug. Presented on FSU Campus on August 2016.
   - Technical Report for the NASA Solar Grant 2017, "Comparison between a fixed and a tracking solar panel", together with student Elazar Mann. Presented on FSU Campus on August 2017.
   - Technical Report for the NASA Grant 2019, "ARES the Intelligent Ground Vehicle", together with student Michael R. Butts. Will be presented and demonstrated, August 2019 on FSU Campus.

10. **Most recent professional development activities:**

   -WV American Water and Waste Water Agency (WVWARN) Charleston, WV, ACCOL Conversion to RS Logix 5000, March 2015.
   -Historian Server training – Invensys Operations Management - Richmond, VA, Sept. 2013
   -InTouch Software training – Invensys Operations Management - Richmond, VA, July 2012
   -Mosebach on the Move – CED Mosebach, Wisp, MD - Rockwell Automation training - May 2012
   -WV American Water and Waste Water Agency (WVWARN) - Charleston, WV, training - March 2012
   -Rockwell Automation – Course CCV207 – Factory Talk View SE Programming - Franklin, TN - Feb. 2011.
   -Microchip Technology – 8 and 16 bit PIC Micro-Controllers Seminar - Pittsburgh, PA - April 2010.
   -National Instruments LabView training Seminar – Cranberry Township, PA - May 2009.
   - SIEMENS – training in Detroit, MI – 07/12 to 07/19/2016. Completed the course titled: "Workshop for Educators Platform S7-1200".
   - SIEMENS – training in Pittsburgh, PA – 07/27 to 08/02/2016. Completed the course titled:
   "TIA Portal WinCC Professional Configuration (SCADA)".
   -SIEMENS – training in Atlanta, GA – 07/2017. Completed the course titled: "Introduction to SINAMICS VFDs"
   -Mosebach on the Move – CED Mosebach, Wisp, MD - Rockwell Automation training - May 2017
   -National Instruments – Webminar: "Autonomous Vehicle using LabVIEW"- September 2018
   -Mosebach on the Move – CED Mosebach, Wisp, MD - Rockwell Automation training – May 2019

APPENDIX C – EQUIPMENT

Please list the major pieces of equipment used by the program in support of instruction.

Classroom Instructional Resources

    All electronics engineering technology classes are held in the engineering technology building and are equipped with whiteboards, projectors and network access. The computer lab located in room 309 of the engineering technology building has software specific to the major and has 15 computers. There are 9 computers with program specific software in Room 307 of the ET Building. There are additional computer labs across campus equipped with general software such as Microsoft Office.

    The electronics engineering technology program has various equipment that satisfy to needs of the courses. Table C-1 bellow lists the necessary equipment used across the courses offered at FSU's CET program.

Course	Equipment	Related Outcome (1-5)
ELEC 1120	Oscilloscopes, Function Generator, Multimeter, Pwr Supplies	1,2,4
ELEC 1120	Oscilloscopes, Function Generator, Multimeter, Power Supplies, PCs (MS Office, NI Multisim)	1,2,4
ELEC 2225	Oscilloscopes, Function Generator, Multimeter, Power Supplies, PCs (MS Office, NI Multisim)	1,2,3,4
ELEC 2230	Oscilloscopes, Function Generator, Multimeter, Power Supplies, PCs (MS Office, NI Multisim)	1,2,3,4
ELEC 2240	Oscilloscopes, Function Generator, Multimeter, Power Supplies, PCs (MS Office, NI Multisim)	1,2,3,4,5
ELEC 2280	Allen Bradley PLC Software	1,2,4
ELEC 2250	Hampden 3 Phase Machines	1,3,4,5
ELEC 1120	Oscilloscopes, Function Generator, Multimeter, Power Supplies, PCs (MS Office, NI Multisim)	1,2,4
ELEC 3300	National Instruments Multisim Simulation Software	1,2,3,4,5
ELEC 4402	Microsoft Office Word, Excel, PowerPoint, National Instruments Multisim	1,2,3,4,5
ELEC 4410	LabView Simulation Software	1,2,4
ELEC 2280	Allen Bradley PLC Software	1,2,4
ELEC 4420	Siemens PLC Software	1,2,4
ELEC 4401	Depends on capstone and information available	1,2,3,4,5
ELEC 3360	Oscilloscopes, Function Generator, Multimeter	1,2,4,5
ELEC 2270	Parallax Microcontroller Integrated Development Environment	1,2,4,5

| ELEC 3310 | Arduino Integrated Development Environment | 1,2,4,5 |

APPENDIX D – INSTITUTIONAL SUMMARY

Programs are requested to provide the following information.

1. The Institution

    a. Name and address of the institution.

        Fairmont State University
        1201 Locust Ave, Fairmont, WV 26554

    b. Name and title of the chief executive officer of the institution.

        Dr. Mirta Martin – President

    b. Name and title of the person submitting the Self-Study Report.

        James Vassil, PE. FSU Lead ABET Coordinator, Civil Engineering Technology

    c. Name the organizations by which the institution is now accredited, and the dates of the initial and most recent accreditation evaluations.

        Fairmont State University is accredited by The Higher Learning Commission and is a member of the North Central Association, 230 S. LaSalle Street, Suite 7-500, Chicago, IL 60604-1411, (800) 621-7440x105, http://www.ncahlc.org.

        The Teacher Education program is approved by the West Virginia Board of Education and accredited by the National Council for the Accreditation of Teacher Education/Council for the Accreditation of Educator Preparation, 2100 Massachusetts Ave., Suite 500, Washington, DC 20036,(202) 223-0077. In addition, selected teaching specializations are nationally approved by their respective learned society and/or professional organization. The most recent accreditation visit by the higher learning commission occurred in the summer of 2018.

        Selected programs in the College of Science and Technology are accredited by the Engineering Technology Accreditation Commission and Applied Natural Sciences Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, (410) 347-7700. The following programs are currently accredited by ETAC of ABET: A.S. and B.S. Civil, A.S. and B.S. Electronics, and A.S. and B.S. Mechanical Engineering Technology. In addition, the B.S. Occupational Safety program is accredited by ANSAC of ABET. The Engineering Technology programs have been accredited by ABET since 1988. The most recent accreditation visit was October 2013.

        The A.S. Nursing program is accredited by the West Virginia Board of Examiners for Registered Professional Nurses, 90 MacCorkle Avenue, SW, Suite 203, South Charleston, WV 25303, (304) 744-0900, Fax: (304) 744-0600, http://wwww.rnboard@wv.gov and the

Accreditation Commission for Education in Nursing (ACEN), 3343 Peachtree Road NE, Suite 850, Atlanta, GA, 30326, (404)975-5000, http://acenursing.org; the B.S. Nursing program is accredited by the Commission on Collegiate Nursing Education (CCNE), One Dupont Circle, NW Suite 530, Washington, DC, 20036, (202) 887-8476, http://www.aacn.nche.edu.

The School of Business is accredited by the Accreditation Council for Business Schools and Programs (ACBSP) 11520 West 119th Street, Overland Park, KS 66213, (913) 339-9356, www.acbsp.org.

The University is also a member of the American Association of Colleges for Teacher Education, National League for Nursing, American Library Association, and Public Relations Society of America (PRSA) West Virginia Chapter.

2. Type of Control
Description of the type of managerial control of the institution, e.g., private-non-profit, private-other, denominational, state, federal, public-other, etc.

Fairmont State University is a state institution governed by the state legislature and with oversight by the WV Higher Education Policy Commission. According to Chancellor, Paul Hill, PhD, "The West Virginia Higher Education Policy Commission is responsible for developing, establishing, and overseeing the implementation of a public policy agenda for the state's four-year colleges and universities. It is charged with oversight of higher education institutions to ensure they are accomplishing their missions and implementing the provisions set by state statute".

3. Educational Unit
Describe the educational unit in which the program is located including the administrative chain of responsibility from the individual responsible for the program to the chief executive officer of the institution. Include names and titles. An organization chart may be included.

Administrative Structure
The following positions and descriptions of duties represent the top-down hierarchy of the institution. The management of the academic program begins with oversight by the Board of Governors but is managed by the program coordinator and faculty.

Board of Governors
As noted on the Board of Governors' website (http://www.fairmontstate.edu/aboutfsu/board-governors) , the BOG "determines, controls, supervises and manages the financial, business and education policies and affairs" of Fairmont State University. (§18B-2A-4(a)) Its membership, terms of office, responsibilities, powers and electoral procedures are further governed by West Virginia Code, Chapter 18B. The twelve-member board meets bi-monthly on campus. Meetings are open to the public and anyone with an interest in the governance of the university is welcome to attend. Various

campus reports are routinely sent to the Board of Governors. The Board of Governors may also make specific requests for data from the campus. These requests are routed through the President's Office, and from there they are routed to the appropriate office for response. All requested information is collected, and the campus response is then issued by the President's Office.

The President

The President is the chief executive officer on the campus and oversees the operation of the campus, including the academic, financial, student services, and external communication programs in consultation with the vice presidents of each of these areas. The President also serves as the campus representative to the West Virginia Legislature, the WVHEPC, and to the region the campus serves. The President is responsible to the Board of Governors.

Provost /Vice President for Academic Affairs

The Office of the Vice President for Academic Affairs (Provost) maintains the integrity of FSU's academic mission by overseeing academic programs, policies, procedures, calendars, academic appointments, promotion and tenure, and faculty grants and fellowships. Positions that report to Academic Affairs include academic Deans, the Director of the Honors Program, the Coordinator of the Advising Center, and the Director of the Center for Civic Engagement.

Associate Provost/Vice President for Academic Affairs

This administrator assists in the conduct of the academic functions of the University. When necessary, the Associate Provost assumes responsibility for academic matters in the absence of the Provost and Vice President for Academic Affairs.

College/School Deans, Associate Deans, and Department Chairs

The Dean is charged with implementing academic policies. They have authority to supervise the academic functions of faculty members within their academic units.

FSU ABET Lead Program Coordinator

The lead coordinator is charged with assisting College/School Dean with academic functions including;
- Developing curriculum revisions
- Maintaining specialized accreditation
- Securing adjunct faculty
- Generating five-year program review reports
- Directing program faculty
- Reviewing academic transfers
- Contact person for all program matters

Program Faculty

Each faculty member within the Department of Technology are responsible for the development and delivery of materials within the constraints of the established program objectives and outcomes. Faculty members are also responsible for assessment of course outcomes to ensure students are meeting program outcomes and objectives. The command and coordination structure of the Department of Technology is shown below:
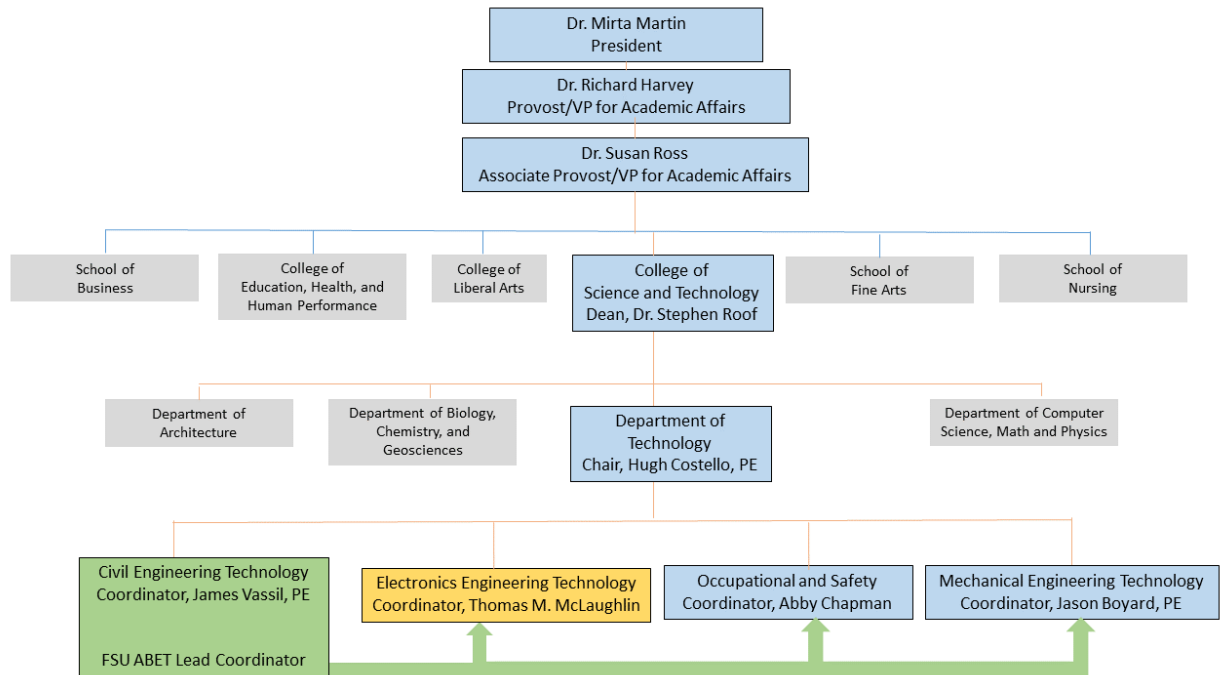
4. Academic Support Units

List the names and titles of the individuals responsible for each of the units that teach courses required by the program being evaluated, e.g., mathematics, physics, etc.

Chemistry/Biology:	Dr. Stephen Roof, Interim Dean
English:	Dr. Deanna Shields, Dean
Fine Arts:	Dr. Francine Kirk, Interim Dean
Math/Computer Science/Physics:	Dr. Stephen Roof, Interim Dean
Social Sciences:	Dr. Deanna Shields, Dean
Technology:	Dr. Stephen Roof, Interim Dean

5. Non-academic Support Units

List the names and titles of the individuals responsible for each of the units that provide non-academic support to the program being evaluated, e.g., library, computing facilities, placement, tutoring, etc.

Non-academic Unit	Director
Academic Advising	Jennifer Jones
Career Services	Ashley Tasker
Computing Services	Jonnie Raisovich
Housing	Alicia Kalka
Library	Sharon Mazure
Student Life	Alicia Kalka
Tutoring	James Mathews

6. Credit Unit

It is assumed that one semester or quarter credit normally represents one class hour or three laboratory hours per week. One academic year normally represents at least 28 weeks of classes, exclusive of final examinations. If other standards are used for this program, the differences should be indicated.

The university operates on a 16-week semester for fall and spring providing 32 weeks of instruction and examination during one fiscal year. At Fairmont State University, one credit hour is awarded for each class hour. Laboratory hours, in general, are two contact hours for one credit hour.

7. Tables

Complete the following tables for the program undergoing evaluation.

Table D-1. Program Enrollment and Degree Data

Electronics Engineering Technology

	Academic Year		Enrollment Year 1st	2nd	3rd	4th	5th	Total Undergrad	Total Grad	Degrees Awarded Associates	Bachelors	Masters	Doctorates
Current Year	2018	FT	15	10	5	12	0	42	11	3	8	NA	NA
		PT	1	0	0	1	0						
1	2017	FT	11	5	10	8	0	34	5	2	3	NA	NA
		PT	0	0	0	0	0						
2	2016	FT	11	8	4	10	0	33	8	2	6	NA	NA
		PT	0	0	0	0	0						
3	2015	FT	22	5	2	13	0	42	7	1	6	NA	NA
		PT	0	0	0	0	0						
4	2014	FT	12	3	5	14	0	34	7	1	6	NA	NA
		PT	0	0	0	0	0						

Give official fall term enrollment figures (head count) for the current and preceding four academic years and undergraduate and graduate degrees conferred during each of those years. The "current" year means the academic year preceding the on-site visit.

FT--full time
PT--part time

Table D-2. Personnel

Bachelor of Science Electronics Engineering Technology
Year: 2018

	HEAD COUNT		FTE[2]
	FT	PT	
Administrative[2]	0	1	
Faculty (tenure-track)[3]	2	0	
Other Faculty (excluding student Assistants)	1	1	
Student Teaching Assistants[4]	0	0	
Technicians/Specialists	0	0	
Office/Clerical Employees	0	0	
Others[5]	0	0	

Report data for the program being evaluated.

1. Data on this table should be for the fall term immediately preceding the visit. Updated tables for the fall term when the ABET team is visiting are to be prepared and presented to the team when they arrive.

2. Persons holding joint administrative/faculty positions or other combined assignments should be allocated to each category according to the fraction of the appointment assigned to that category.

3. For faculty members, 1 FTE equals what your institution defines as a full-time load.

4. For student teaching assistants, 1 FTE equals 20 hours per week of work (or service). For undergraduate and graduate students, 1 FTE equals 15 semester credit-hours (or 24 quarter credit-hours) per term of institutional course work, meaning all courses — science, humanities and social sciences, etc.

5. Specify any other category considered appropriate, or leave blank.

Submission Attesting to Compliance

Only the Dean or Dean's Delegate can electronically submit the Self-study Report.

ABET considers the on-line submission as equivalent to that of an electronic signature of compliance attesting to the fact that the program conducted an honest assessment of compliance and has provided a complete and accurate disclosure of timely information regarding compliance with ABET's *Criteria for Accrediting Engineering Programs* to include the General Criteria and any applicable Program Criteria, and the ABET *Accreditation Policy and Procedure Manual*.