POST-AUDIT REVIEW

For Occupational Programs
Implemented Under the Provisions of Series 37 of the
West Virginia Council for Community and Technical College Education

Institution: Southern West Virginia Community and Technical College
Program: Mechatronics, Associate in Applied Science

April 2017

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I. Introduction

The Mechatronics Program prepares students for industrial automation in applications (engineering) positions, as well as service (maintenance) type positions by providing knowledge and hands-on experience in electricity, fluid power, sensors., control systems, robotics, and programmable controllers – components that are used in a wide variety of industrial automation systems, machines, and equipment.

The program is designed for people who are interested in product development, plant maintenance, machine set-up and installation, and troubleshooting of modern computer controlled machines. Mechatronics Engineering Technician jobs are found in the manufacturing, energy, medical, electronics, agriculture, biotechnology, and automotive industries.

The full Mechatronics Program is available on the Williamson Campus. The general education/program support courses may be taken at other Southern campuses.

II. Goals and Objectives

The current options were identified as needed by displaced workers. Southern received grants to develop the mechatronics program to meet the needs of these workers. The goal of the grants is to provide displaced workers an opportunity to learn new skills and be employable in in-demand fields. The mechatronics program supports this overarching goal.

The mechatronics program has the following main goals.

1. Prepare students to enter a baccalaureate program in mechatronics industrial automation (engineering).
2. Prepare students for entry-level service (maintenance) positions.
3. Provide skill set enhancement to persons presently performing electrical, mechanical, fluid power, and/or control systems tasks.

III. Assessment

A. Assessment of the mechatronics option occurs primarily at the course level. In addition, mechatronics is incorporated into the college's assessment program. Regular assessment of program goals is made. Curricular changes have been made in response to identified needs.

B. The program focuses training in the areas of electrical, mechanical, pneumatic/hydraulic, and robotics. Basic knowledge of the subsystems is learned and then the subsystems are integrated as the student moves through the mechatronics program.

Early assessment information indicates a greater emphasis needs to be placed on robotics, leading to changes within courses.

C. Courses have been added, and sequences and prerequisites have been adjusted as a result of early assessment information.

IV. Curriculum

A. The Mechatronics Associate in Applied Science degree consists of a total of 60 Credit hours. Twenty of those hours are general education/support classes. There is one elective (social science) with in the general education component of the curriculum. The 40 credit hours of major course consist of 22 hours of required coursework with the remaining 18 being restricted electives. These electives are structured around business and industry demand.

Southern has an open-door admission policy. Any person with a high school diploma or GED may take classes at Southern. All entering students will use ACT scores or take a placement test to be placed in the proper math and English courses. Southern utilizes a co-curricular model for delivery of remedial math and English. Southern has had good success in helping students elevate their abilities to be a success in college-level math and English. Use of the co-curricular model helps students to complete the certificate program on time (two semesters).

B. Appendix I shows the program curriculum.

C. All mechatronics classes are delivered face-to-face. All general education/support courses are available face-to-face. Some support courses are available online as well.

V. Faculty

The general education courses are taught by a mixture of full-time and part-time faculty. The college maintains appropriate standards for faculty teaching transfer courses for the general education courses. The major courses have been taught by a total of five full-time and four part-time faculty during the review period. Their faculty data sheets can be found in Appendix II. The majority of sections of major courses are taught by full-time faculty. General education courses are taught by a mixture of tenured and non-tenured faculty, while all major courses are taught by non-tenured faculty.

VI. Enrollment and Graduates

A. The first students to graduate did so after the fourth semester of the program as expected. Two graduated that semester. Two more students graduated the following semester. It remains to be seen how many will graduate this semester, but it is anticipated 4-5 will graduate. The program has maintained an average of 11.6 FTE per year during the three years of the review period. After the first two semesters, the program has maintained approximately 20 majors registered each semester. Additional information can be found in Appendix III.

Southern partners with the U.S. Department of Labor, Robert C. Byrd Institute, and Unilin Corporation to offer a registered apprenticeship program in Occupational Development with an emphasis in mechatronics. Students registered in this program are included in the table in Appendix III.

In fall 2014, five students began their apprenticeship. The table in Appendix III shows four that semester with five registered the following semester. These numbers reflect the data in Southern's database. One of the students had previously attended Southern. His major of record did not get changed in the system until the spring semester.

After the second semester of the apprenticeship program, a second group of five students entered the apprenticeship. The table in Appendix three show the number of students that actually took classes in each semester. This is the reason the number rises from six to seven between fall 2016 and spring 2017. Of the five group I students who began the program, one withdrew from the program and a second changed jobs. One student in group II withdrew from the program. It is anticipated there will be seven apprenticeship program completers.

B. Two students graduated last academic year. No graduate survey data is available from them. Graduate surveys will be sent to the two students who graduated last semester and those that will graduate this semester.

C. This program is not intended to prepare students for a baccalaureate program, but rather to prepare them for a job. Future graduate surveys will provide insight into whether or not graduates are finding appropriate jobs.

VII. Financial

A. Southern was awarded a West Virginia Advance grant and a Technical Program Development grant to support development and implementation of the mechatronics program. The Technical Program Development grant paid for a program coordinator to develop the curriculum and deliver it. The West Virginia Advance grant purchased startup equipment and supplies

needed to deliver the program. The amount awarded in each grant is shown in the table below.

Mechatronics Associate in Applied Science Program Expenses

Year	Departmental Resources	State Appropriated Funds (WV Advance)	Technical Program Development Grant	Total Program Expense
2015	$0	$286,031.63	$5,240.89	$291,272.52
2016	$0	$13,760.62	$58,952.40	$72,713.02
2017	$0	TBD	TBD	TBD
Total		**$299,792.25**	**$64,193.29**	**$363,985.54**

B. Equipment has been purchased and installed to support the mechatronics program. The greatest future expense is anticipated to be the salary to support program faculty. Currently one full-time faculty is supplemented with adjuncts.

VIII. Advisory Committee

The following people have participated in advisory committee meetings during the review period:

Levi Durfee - Bulldog Creative Services
Tadd Fortner-Bulldog Creative Services
Justin Kirk-Thornhill Automotive Group
Steve Williamson-Wright Concrete
Randy Curry - Southern Equipment

During the 2015 meeting, members reviewed the curricula for mechatronics. They approved of what we presented. The relevant conversation in 2016 centered on how knowledge of mechatronics could help workers, especially at Wright Concrete. Those assembled encouraged us to continue to emphasize robotics in our curriculum.

IX. Accreditation

There is no special accreditation information for this program.

Appendix I
Curriculum

Mechatronics - Associate in Applied Science

Component I-General Education Support Courses: 20 Credit Hours

CS 102	Computer Literacy	3 Credit Hours
EN 101 or EN 101A	English Composition I	3 Credit Hours
MT 124 or MT 124A	Technical Math	3 Credit Hours
OR 105	Orientation to Technical Programs	1 Credit Hour
PH 200 or higher	Conceptual Physics	4 Credit Hours
SP 103	Speech Fundamentals	3 Credit Hours
	Social Science Elective	3 Credit Hours

Component II- Specialization Major Courses: 40 Credit Hours

EG 103	Electrical Calculations	3 Credit Hours
EG 105	Industrial Safety	1 Credit Hours
EG 107	Introduction to Circuits	4 Credit Hours
MX 110	Introduction to Mechatronics	2 Credit Hours
MX 120	Mechanical Power I	2 Credit Hours
MX 130	Fluid Power I	2 Credit Hours
MX 180	PLC Fundamentals	1 Credit Hour
MX 184	PLC Interfacing and HMIS	1 Credit Hour
MX 186	PLC Applications	1 Credit Hour
MX 190	Industrial Robotics	3 Credit Hours
MX 298	Capstone	2 Credit Hours
	Specialization Courses	18 Credit Hours

Appendix II
Faculty Data

Faculty Data

Name___John Evans_____Rank__Instructional Specialist_____

Check one:
Full-time__X__ Part-time_____ Adjunct_____ Graduate Asst._____

Highest Degree Earned: Bachelor of Science
Date Degree Received: August, 1974__
Conferred by: West Virginia Institute of Technology_____
Area of Specialization: Electrical Engineering_____

Professional registration/licensure Professional Engineer
Yrs of employment at present institution _1.5__
Yrs of employment in higher education _1.5_
Yrs of related experience outside higher education__41_
Non-teaching experience _41_

To determine compatibility of credentials with assignment:

(a) List courses you taught this year and those you taught last year: (If you participated in team-taught course, indicate each of them and what percent of courses you taught.) For each course include year and semester taught, course number, course title and enrollment.

Year/Semester	Course Number & Title	Enrollment
Fall 2015	EG 103-Electrical Calculations	1
Fall 2015	EG 107-Introduction to Circuits	1
Fall 2015	EG 105-Industrial Safety	1
Fall 2015	EG 123-Electrical Schematics	1
Fall 2015	MX 120-Mechanical Power I	1
Fall 2015	MX 250-Basic Instrumentation	1
Spring 2016	EG 103-Electrical Calculations	14
Spring 2016	MX 120-Mechanical Power I	16
Spring 2016	MX 130-Mechanical Power II	2
Spring 2016	MX 180-PLC Fundamentals	15
Spring 2016	MX 184-PLC Interfacing and HMIS	15
Spring 2016	MX 186-PLC Applications	15

Year/Semester	Course Number & Title	Enrollment
Spring 2016	MX 250-Basic Instrumentation and Control	8
Spring 2016	MX 254-Adv. Instrumentation and Control	7
Summer 2016	MX 140-Manufacturing Processes I	6
Summer 2016	TS 275-Special Topics, Control Loop Tuning & Instrumentation	1
Fall 2016	EG 103-Electrical Calculations	33
Fall 2016	EG 105-Industrial Safety	36
Fall 2016	EG 123-Electrical Schematics	6
Fall 2016	MX 120-Mechanical Power I	7
Fall 2016	MX 230-Fluid Power II	7
Fall 2016	MX 250-Basic Instrumentation & Control	12
Fall 2016	OR 105-Orientation to Technical Programs	8
Spring 2017	MX 110-Introduction to Mechatronics	6
Spring 2017	MX 120-Mechanical Power I	5
Spring 2017	MX 130-Fluid Power I	10
Spring 2017	MX 140-Manufacturing Processes I	5
Spring 2017	MX 190-Industrial Robotics	6
Spring 2017	MX 254-Advanced Instrumentation and Control	7
Spring 2017	MX 256-Control Loop Tuning & Wireless Communication	5
Spring 2017	MX 298-Mechatronics System Design Capstone Course	7

(b) If degree is not in area of current assignment, explain.

(c). Identify your professional development activities during the past five years.

Faculty Data

Name___Sivy Farhi_____ _____Rank____Instructor_____

Check one:
Full-time__X__ Part-time_____ Adjunct____ Graduate Asst._____

Highest Degree Earned: Master of Science
Date Degree Received: 1969
Conferred by: University of Southern California
Area of Specialization: Electrical Engineering_____

Professional registration/licensure __Professional Engineer__
Yrs of employment at present institution _1____
Yrs of employment in higher education __14__
Yrs of related experience outside higher education _30+___
Non-teaching experience _30+_

To determine compatibility of credentials with assignment:

(a) List courses you taught this year and those you taught last year: (If you participated in team-taught course, indicate each of them and what percent of courses you taught.) For each course include year and semester taught, course number, course title and enrollment.

Year/Semester	Course Number & Title	Enrollment
Fall 2015	EG 103-Electrical Calculations	19
Fall 2015	EG 107-Introduction to Circuits	15
Fall 2015	EG 214-Electrical Control Systems	16
Fall 2015	EG 181-Analog Electronics	15
Spring 2016	EG 123-Electrical Schematics	24
Spring 2016	EG 171-Circuit Analysis I	11
Spring 2016	EG 220-Machines and Power Systems	9
Spring 2016	EG 296-Program Logic Control	13
Spring 2016	EG 297-National Electric Code	18

(b) If degree is not in area of current assignment, explain
Mr. Farhi has left Southern for medical reasons and will not return.

(c). Identify your professional development activities during the past five years.

Faculty Data

Name William Moseley Rank Instructor

Check one:

Full-time X Part-time_____ Adjunct___ Graduate Asst._____

Highest Degree Earned: Bachelor of Science
Date Degree Received: May, 1973
Conferred by: West Virginia Institute of Technology
Area of Specialization: Electrical Engineering

Professional registration/licensure _____
Yrs of employment at present institution 8
Yrs of employment in higher education 8
Yrs of related experience outside higher education 33
Non-teaching experience 30

To determine compatibility of credentials with assignment:

(a) List courses you taught this year and those you taught last year: (If you participated in team-taught course, indicate each of them and what percent of courses you taught.) For each course include year and semester taught, course number, course title and enrollment.

Year/Semester	Course Number & Title	Enrollment
Fall 2012	EG 103-Electrical Calculations	18
Fall 2012	EG 105-Industrial Safety	17
Fall 2012	EG 107-Introduction to Circuits	18
Fall 2012	EG 171-Circuit Analysis I	16
Fall 2012	EG 181-Analog Electronics	10
Fall 2012	EG 214-Electrical Controlled Systems	10
Spring 2013	EG 172-Circuit Analysis II	13
Spring 2013	EG 214-Electrical Control Systems	13
Spring 2013	EG 220-Machines and Power Systems	8
Spring 2013	EG 296-Program Logic Control	6
Spring 2013	EG 297-National Electric Code	9
Fall 2013	EG 103-Electrical Calculations	15
Fall 2013	EG 105-Industrial Safety	15
Fall 2013	EG 107-Introduction to Circuits	16
Fall 2013	EG 181-Analog Electronics	9
Fall 2013	EG 220-Machines and Power Systems	9
Year/Semester	**Course Number & Title**	**Enrollment**

Fall 2013	EG 296-Program Logic Control	10
Fall 2013	EG 297-National Electric Code	11
Spring 2014	EG 123-Electrical Schematics	14
Spring 2014	EG 171-Circuit Analysis I	11
Spring 2014	EG 172-Circuit Analysis II	10
Fall 2014	EG 103-Electrical Calculations	27
Fall 2014	EG 105-Industrial Safety	24
Fall 2014	EG 107-Introduction to Circuits	22
Fall 2014	EG 214-Electrical Control Systems	10
Fall 2014	EG 296-Program Logic Control	10
Fall 2014	EG 297-National Electric Code	2
Spring 2015	EG 123-Electrical Schematics	22
Spring 2015	EG 171-Circuit Analysis I	20
Spring 2015	EG 220-Machines and Power Systems	8
Spring 2015	EG 275-Special Topics, Intro to Residential Wiring	3
Spring 2015	EG 275-Special Topics, Commercial Wiring	16
Spring 2015	EG 297-National Electric Code	16
Summer 2015	EG 275-Special Topics, Intro to Residential Wiring	3
Fall 2016	EG 107-Introduction to Circuits	11
Fall 2016	EG 172-Circuit Analysis II	8
Fall 2016	EG 298-Electrical Engineering Technology Capstone Course	4
Spring 2017	OR 105-Orientation to Technical Programs	13
Spring 2017	EG 171-Circuit Analysis I	13
Spring 2017	EG 172-Circuit Analysis II	9
Spring 2017	EG 220-Machines and Power Systems	4
Spring 2017	EG 290-Digital Electronics	3
Spring 2017	MX 180-PLC Fundamentals	7
Spring 2017	MX 184-PLC Interfacing and HMIS	7
Spring 2017	MX 186-PLC Applications	7

(b) If degree is not in area of current assignment, explain.

(c). Identify your professional development activities during the past five years.

Faculty Data

Name Steven White Rank Instructional Specialist

Check one:

Full-time X Part-time_____ Adjunct___ Graduate Asst._____

Highest Degree Earned: Masters of Science
Date Degree Received: 5/2006
Conferred by: University of Fayetteville Arkansas
Area of Specialization: Operations Management Safety Management

Professional registration/licensure: Yes
Yrs of employment at present institution: 5
Yrs of employment in higher education: 11
Yrs of related experience outside higher education: 33
Non-teaching experience: 22

To determine compatibility of credentials with assignment:

(a) List courses you taught this year and those you taught last year: (If you participated in team-taught course, indicate each of them and what percent of courses you taught.) For each course include year and semester taught, course number, course title and enrollment.

Year/Semester	Course Number & Title	Enrollment
Spring 2013	CS 102-Computer Literacy	19
Spring 2013	DR 204-Computer Aided Design and Drafting I	7
Spring 2013	EG 123-Electrical Schematics	14
Fall 2014	DR 204-Computer Aided Design and Drafting I	11
Fall 2014	EG 123-Electrical Schematics	5
Spring 2015	EG 105-Industrial Safety	5
Spring 2015	MX 110-Introduction to Mechatronics	5
Spring 2015	MX 120-Mechanical Power I	3
Spring 2015	MX 130-Fluid Power I	2
Spring 2015	MX 180-PLC Fundamentals	2
Spring 2015	MX 186-PLC Applications	2

Year/Semester	Course Number & Title	Enrollment
Spring 2015	ST 110-Industrial Safety and Risk Management	5
Summer 2015	DR 204-Computer Aided Design and Drafting I	3
Fall 2015	OR 105-Orientation to Technical Programs	8
Fall 2015	OR 105-Orientation to Technical Programs	27
Fall 2015	EG 103-Electrical Calculations	19
Fall 2015	EG 105-Industrial Safety	9
Fall 2015	EG 107-Introduction to Circuits	17
Fall 2015	MX 110-Introduction to Mechatronics	5
Fall 2015	MX 130-Fluid Power I	5
Fall 2015	MX 220-Mechanical Power II	2
Spring 2016	EG 105-Industrial Safety	13
Spring 2016	EG 107-Introduction to Circuits	13
Spring 2016	MX 110-Introduction to Mechatronics	19
Spring 2016	MX 130-Fluid Power I	36
Spring 2016	MX 190-Industrial Robotics	14
Spring 2016	MX 230-Fluid Power II	12
Spring 2016	TS 275-Special Topics, Mechatronics Capstone Course	2
Fall 2016	DR 204-Computer Aided Design and Drafting I	14
Fall 2016	EG 171-Circuit Analysis I	7
Fall 2016	EG 214-Electrical Control Systems	21
Fall 2016	MX 220-Mechanical Power II	8
Fall 2016	MX 298-System Design-Mechatronics Program Capstone Course	3

(b) If degree is not in area of current assignment, explain.

(c). Identify your professional development activities during the past five years.

Faculty Data

Name: ___Aaron St.Clair_____Rank____Instructor_____

Check One: Full-time ____X_____ Part-time _____ Adjunct _____

Highest Degree Earned: Bachelor of Science
Date Degree Received: _May 2006____
Conferred by: West Virginia University Institute of Technology_____
Area of Specialization: Computer Science_____

Professional registration/licensure: none
Yrs of employment at present institution: 1
Yrs of employment in higher education: 1
Yrs of related experience outside higher education: 5
Non-teaching Experience: programming, systems engineering, project management

To determine compatibility of credentials with assignment:

(a) List courses you taught this year and those you taught last year. (If you participated in team-taught course, indicate each of them and what percent of courses you taught). For each course include year and semester taught, course number, course title and enrollment.

Year/Semester	Course Number/Title	Enrollment
Fall 2014	CS 102 Computer Literacy	53
Fall 2014	CS 103 Introduction to Applications	24
Spring 2015	CS 102 Computer Literacy	77
Spring 2015	EG 103 Electrical Calculations	3
Spring 2015	EG 107 Introduction to Circuits	4
Summer 2015	MX 190 Industrial Robotics	1

(b) If degree is not in area of current assignment, explain.
Mr. St. Clair has completed most of the coursework necessary for a B.S. E.E. He has also worked in systems engineering with an emphasis on design and worked as an installer.

(c). Identify your professional development activities during the past five years.

Faculty Data

Name___William Anderson_____Rank____N/A_____

Check one:
Full-time_____ Part-time_____ Adjunct__X__ Graduate Asst._____

Highest Degree Earned: Associate of Applied Science
Date Degree Received _December 2006__
Conferred by: Southern West Virginia Community and Technical College_____
Area of Specialization: Electrical Engineering_____

Professional registration/licensure: Master Electrician
Yrs of employment at present institution: _2____
Yrs of employment in higher education: _2___
Yrs of related experience outside higher education:_____
Non-teaching experience: _____

To determine compatibility of credentials with assignment:

(a) List courses you taught this year and those you taught last year: (If you participated in team-taught course, indicate each of them and what percent of courses you taught.) For each course include year and semester taught, course number, course title and enrollment.

Year/Semester	Course Number & Title	Enrollment
Fall 2015	EG 105-Industrial Safety	16
Fall 2015	EG 172-Circuit Analysis II	20
Spring 2016	EG 275-Residential Wiring	6
Fall 2016	EG 181-Analog Electronics	7
Fall 2016	EG 107-Introduction to Circuits	4
Spring 2017	EG 225-Commercial Wiring	9
Spring 2017	EG 297-National Electric Code	8

(b) If degree is not in area of current assignment, explain

(c). Identify your professional development activities during the past five years.

Faculty Data

Name Thomas Bane Rank N/A

Check one:
Full-time_____ Part-time_____ Adjunct_X_ Graduate Asst._____

Highest Degree Earned: Bachelor of Science
Date Degree Received: December, 1988
Conferred by: California University of Pennsylvania
Area of Specialization: Mathematics and Computer Science

Professional registration/licensure: _____
Yrs of employment at present institution: 0.5
Yrs of employment in higher education: 0.5
Yrs of related experience outside higher education: 18
Non-teaching experience: 10

To determine compatibility of credentials with assignment:

(a) List courses you taught this year and those you taught last year: (If you participated in team-taught course, indicate each of them and what percent of courses you taught.) For each course include year and semester taught, course number, course title and enrollment.

Year/Semester	Course Number & Title	Enrollment
Fall 2016	CS 102-Computer Literacy	8
Spring 2017	CS 102-Computer Literacy	12
Spring 2017	DR 206-Computer Aided Design and Drafting II	4

(b). If degree is not in area of current assignment, explain.

(c). Identify your professional development activities during the past five years.

Faculty Data

Name Robert Bryant Rank N/A

Check one:

Full-time_____ Part-time_____ Adjunct__X__ Graduate Asst._____

Highest Degree Earned: Associate____
Date Degree Received: April 2000_____
Conferred by: Everest Institute_____
Area of Specialization: Electronics and Computer Engineering Technology___

Professional registration/licensure: _____
Yrs of employment at present institution: 0.5____
Yrs of employment in higher education: 0.5___
Yrs of related experience outside higher education:_____
Non-teaching experience:_____

To determine compatibility of credentials with assignment:

(a) List courses you taught this year and those you taught last year: (If you participated in team-taught course, indicate each of them and what percent of courses you taught.) For each course include year and semester taught, course number, course title and enrollment.

Year/Semester	Course Number & Title	Enrollment
Spring 2017	EG 123-Electrical Schematics	11

(b) If degree is not in area of current assignment, explain.
Mr. Bryant has extensive training in electronics in a variety of applications; especially in controls. He is an expert in PLC's.

(c). Identify your professional development activities during the past five years.

Faculty Data

Name Minness Justice Rank N/A

Check one:

Full-time_____ Part-time_____ Adjunct X Graduate Asst._____

Highest Degree Earned: _____
Date Degree Received:_____
Conferred by:_____
Area of Specialization:_____

Professional registration/licensure:_____
Yrs of employment at present institution:_____
Yrs of employment in higher education:_____
Yrs of related experience outside higher education:_____
Non-teaching experience: 25+

To determine compatibility of credentials with assignment:

(a) List courses you taught this year and those you taught last year: (If you participated in team-taught course, indicate each of them and what percent of courses you taught.) For each course include year and semester taught, course number, course title and enrollment.

Year/Semester	Course Number & Title	Enrollment
Fall 2016	EG 107-Introduction to Circuits	19
Spring 2017	EG 123-Electrical Schematics	9

(b) If degree is not in area of current assignment, explain.
Mr. Justice has an extensive electrical background in the Airforce and over 25 years as an electrical inspector for MSHA. He is also frequently called as an expert witness in court cases involving electrical work.

(c). Identify your professional development activities during the past five years.

Appendix III
Enrollment and Graduates

Semester	Program AAS Grads	Mechatronics Class FTE	Nonduplicate Student Headcount	AAS Degree Majors	Apprenticeship Students
201501	0	NA	NA	2	4
201502	0	1.73	5	14	5
201601	0	1.87	8	22	8
201602	2	16.40	33	29	6
201701	2	4.93	16	24	6
201702	TBD	9.73	19	19	7
Total	**4**	**34.66**			