

Program Review

AAS in Mechatronics (CIP: 47.0105)

Program Purpose

What is the published purpose/mission of the program?
The Mechatronics Program prepares students for entry-level employment in the industrial electronics field. This program supports mission goals three and seven.
How does the program's purpose/mission fit into the overall mission of the college?
The MCH program supports NACC Mission goals three and seven.
Do any changes need to be made to the program's purpose/mission? Explain.
Changes are implemented as the needs of industry change.
Do any changes need to be made to how the program's purpose/mission fits into the overall college mission? Explain.
No.

Program Learning Outcomes

What are the program learning outcomes?

A.A.S.—Mechatronics

Graduates of the Mechatronics Program will be able to:

- Function as a competent entry-level industrial electrician (ADM 150-154)
- Perform all tasks in a safe manner. (ADM 150-154)
- Exhibit a positive work ethic. (ADM 150-154)

How are the Program Learning Outcomes assessed?

The student will perform all task in a safe manner.

In ADM 150-154, throughout the class the student will perform tasks in a safe manner with 100% proficiency according to the Standardized Occupational Safety and Health Rubric.

The student will exhibit a positive work ethic.

In ADM 150-154, the student’s work ethic will be assessed by scoring at least 30 points on a standardized Workplace Readiness Skills Rubric.

The student will function as a competent entry-level industrial electrician.

In ADM 150-154, before entering the cooperative education program, the student must score a minimum of 75% on a comprehensive knowledge and skills checklist.

What can students do with the knowledge they have after completing the program?

Pursue employment in fields that require knowledge of complex electronic equipment for a variety of functions.

What are the plans for reviewing the program learning outcomes and revising them?

The program learning outcomes are reviewed each year when the program sets its Unit Goals. The program coordinator records specific actions undertaken to achieve the program learning outcomes goals, the results of the evaluation of the outcomes, and improvements that have been made in the program after evaluating and analyzing the goals.

Assessed Needs and Assumptions

What are the occupational projections for careers for which the program trains?				
Occupation	Region	Employment		Percent Change
		2019	2029	
Installation, maintenance, and repair occupations (49-0000)	Nation	6,128,000	6,301,300	2.8%
Source: National Data—Bureau of Labor Statistics, Occupational Outlooks Handbook. (https://www.bls.gov/emp/tables/occupational-projections-and-characteristics.htm)				

Occupation	Region	Employment		Percent Change
		2018	2028	
Installation, maintenance, and repair occupations (49-0000)	Statewide	100,360	107,190	6.81%
	Workforce Development Region 2	7,360	7,690	4.49%

Source: State and Regional Data—Alabama Department of Labor, Industry and Occupation Projection 201 2028. (<http://www2.labor.alabama.gov/Projections/ProjectionsTAB.aspx>)

Based on the occupational projections, what is the employment outlook for graduates of the program?

Based on feedback from local industries, there is a shortage of qualified technicians. This is due to industry growth, aging workforces, and other factors.

What is the outlook for the continued need of the program within the mission of the college?

Growing economies both nationally and locally will have a continued and increased demand for graduates of the IST program. Mission goal seven supports the training of our students to fill the needs of local industries.

Structure

What credentials does the program offer?

Associate in Applied Science Degree (AAS)

Short-Term Certificate (STC)

- Mechatronics – Basic Electrical
- Mechatronics – General
- Mechatronics – Industrial Electrical Technician

Certificate (CER)

- Mechatronics – Industrial Control Technician

What are the requirements for each credential?

Associate in Applied Science Degree (AAS). Degree plan retrieved from NACC DegreeWorks, October 11, 2022.

General Education Core: Areas I-IV

Credits required: 21 Credits applied: 0 Catalog year: 2022-2023

<input type="radio"/>	Minimum Credits Required	Still needed:	You currently have 0 credits including both earned and in-progress courses. You need to successfully complete a minimum of 21 additional credits.
<input type="radio"/>	AREA I - WRITTEN COMPOSITION	Still needed:	1 Class in ENG 100 or 101
<input type="radio"/>	AREA II - HUMANITIES & FINE ARTS		
<input type="radio"/>	Fundamentals of Oral Communication or Public Speaking	Still needed:	1 Class in SPH 106 or 107
<input type="radio"/>	Humanities & Fine Arts	Still needed:	1 Class in ART 100 or 203 or 204 or MUS 101 or PHL 206 or REL 100 or 151 or 152 or SPA 201 or 202 or THR 120 or 126
<input type="radio"/>	AREA III - NATURAL SCIENCES & MATHEMATICS		
<input type="radio"/>	Microcomputer Applications	Still needed:	1 Class in CIS 146
<input type="radio"/>	Mathematics	Still needed:	1 Class in BUS 271 or MTH 100 or 103 or 110 or 112 or 113 or 120 or 125 or 126 or 227 or 231 or 232 or 237 or 238 or 265
<input type="radio"/>	Math, Science, or CIS	Still needed:	3 Credits in AST 220 or BIO 103 or 104 or 201 or 202 or 220 or 230 or CHM 104 or 105 or 111 or 112 or 221 or 222 or CIS @ or MTH 100 or 103 or 110 or 112 or 113 or 116 or 120 or 125 or 126 or 227 or 231 or 232 or 237 or 238 or 265 or PHS 111 or 112 or PHY 115 or 120 or 201 or 202 or 213 or 214
<input type="radio"/>	AREA IV - HISTORY, SOCIAL, & BEHAVIORAL SCIENCES		
<input type="radio"/>	History, Social, & Behavioral Science	Still needed:	1 Class in ECO 231 or 232 or GEO 100 or HIS 101 or 102 or 201 or 202 or POL 211 or PSY 200 or 210 or SOC 200 or 210

Mechatronics: Area V

Credits required: 49 Credits applied: 0 Catalog year: 2022-2023

<input type="radio"/>	Minimum Credits Required	Still needed:	You currently have 0 credits including both earned and in-progress courses. You need to successfully complete a minimum of 49 additional credits.
<input type="radio"/>	Intro to Instruments & Process Control	Still needed:	1 Class in ILT 108
<input type="radio"/>	Electrical Blueprint Reading	Still needed:	1 Class in ILT 109
<input type="radio"/>	DC Fundamentals	Still needed:	1 Class in ILT 160
<input type="radio"/>	AC Fundamentals	Still needed:	1 Class in ILT 161
<input type="radio"/>	Solid State Fundamentals	Still needed:	1 Class in ILT 162
<input type="radio"/>	Digital Fundamentals or Fundamentals of Industrial Hydraulics & Pneumatics	Still needed:	1 Class in ILT 163 or INT 118
<input type="radio"/>	Motors & Transformers I	Still needed:	1 Class in ILT 166
<input type="radio"/>	Programmable Logic Controls	Still needed:	1 Class in ILT 194
<input type="radio"/>	Troubleshooting Techniques	Still needed:	1 Class in ILT 195
<input type="radio"/>	Motor Controls I	Still needed:	1 Class in ILT 197
<input type="radio"/>	Industrial Robotics	Still needed:	1 Class in ILT 216
<input type="radio"/>	Industrial Robotics Lab	Still needed:	1 Class in ILT 217
<input type="radio"/>	Elements of Industrial Control II	Still needed:	1 Class in ILT 276
<input type="radio"/>	Elements of Industrial Control II Lab	Still needed:	1 Class in ILT 277
<input type="radio"/>	Workplace Skills	Still needed:	1 Class in WKO 106
<input type="radio"/>	WKO Elective	Still needed:	1 Class in WKO 110 or 131 or 132 or 133 or 134
<input type="radio"/>	Technical Cooperative Education	Still needed:	3 Credits in ADM 150 or 151 or 152 or 153 or 154

Mechatronics – Basic Electrical (STC). Degree plan retrieved from NACC DegreeWorks, October 11, 2022.

Mechatronics - Basic Electrical: Area V

Credits required: 12 Credits applied: 0 Catalog year: 2022-2023

<input type="radio"/>	DC Fundamentals	Still needed:	1 Class in ILT 160
<input type="radio"/>	AC Fundamentals	Still needed:	1 Class in ILT 161
<input type="radio"/>	Construction Wiring NEC	Still needed:	1 Class in ILT 118
<input type="radio"/>	National Electric Code	Still needed:	1 Class in ILT 231

Mechatronics – General (STC). Degree plan retrieved from NACC DegreeWorks, October 11, 2022.

Mechatronics – Industrial Electrical Technician (STC). Degree plan retrieved from NACC DegreeWorks, October 11, 2022.

Mechatronics - Industrial Electrical Tech: Area V

Credits required: 24 Credits applied: 0 Catalog year: 2022-2023

<input type="radio"/>	Electrical Blueprint Reading	Still needed:	1 Class in ILT 109
<input type="radio"/>	DC Fundamentals	Still needed:	1 Class in ILT 160
<input type="radio"/>	AC Fundamentals	Still needed:	1 Class in ILT 161
<input type="radio"/>	Solid State Fundamentals	Still needed:	1 Class in ILT 162
<input type="radio"/>	Digital Fundamentals	Still needed:	1 Class in ILT 163
<input type="radio"/>	Motors & Transformers I	Still needed:	1 Class in ILT 166
<input type="radio"/>	Programmable Logic Controls	Still needed:	1 Class in ILT 194
<input type="radio"/>	Motor Controls I	Still needed:	1 Class in ILT 197

Mechatronics – Industrial Control Technician (CER). Degree plan retrieved from NACC DegreeWorks, October 11, 2022.

General Education Core

Credits required: 12 Credits applied: 0 Catalog year: 2022-2023

<input type="radio"/>	Minimum Credits Required	Still needed:	You currently have 0 credits including both earned and in-progress courses. You need to successfully complete a minimum of 12 additional credits.
<input type="radio"/>	English Composition	Still needed:	1 Class in ENG 100 or 101
<input type="radio"/>	Fundamentals of Oral Communication or Public Speaking	Still needed:	1 Class in SPH 106 or 107
<input type="radio"/>	Mathematics	Still needed:	1 Class in BUS 271 or MTH 100 or 103 or 110 or 112 or 113 or 120 or 125 or 126 or 227 or 231 or 232 or 237 or 238 or 265
<input type="radio"/>	Microcomputer Applications	Still needed:	1 Class in CIS 146

Mechatronics-Industrial Control Technician: Area V

Credits required: 27 Credits applied: 0 Catalog year: 2022-2023

<input type="radio"/>	Minimum Credits Required	Still needed:	You currently have 0 credits including both earned and in-progress courses. You need to successfully complete a minimum of 27 additional credits.
<input type="radio"/>	Electrical Blueprint Reading	Still needed:	1 Class in ILT 109
<input type="radio"/>	DC Fundamentals	Still needed:	1 Class in ILT 160
<input type="radio"/>	AC Fundamentals	Still needed:	1 Class in ILT 161
<input type="radio"/>	Solid State Fundamentals	Still needed:	1 Class in ILT 162
<input type="radio"/>	Digital Fundamentals	Still needed:	1 Class in ILT 163
<input type="radio"/>	Motors & Transformers I	Still needed:	1 Class in ILT 166
<input type="radio"/>	Programmable Logic Controls	Still needed:	1 Class in ILT 194
<input type="radio"/>	Motor Controls I	Still needed:	1 Class in ILT 197
<input type="radio"/>	Workplace Skills	Still needed:	1 Class in WKO 106

How often are the requirements for the degree reviewed?

Degree requirements are reviewed every year.

Are there any plans for revising the degree requirements?

Degree plans may change depending on industry demand.

Accreditation

What is the institutional accreditation for the program?
The Mechatronics Program is within the institutional accreditation granted by the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) and reaffirmed in 2015.
Does the program have any program-specific accreditations?
No.

Instructors

Who are the current instructors in the program, and what are their credentials?
<ul style="list-style-type: none">• Galen Andrews A.A.S., Southern Crescent Technical College, Griffin, Georgia 30+ years' experience as Industrial / Building Maintenance
<ul style="list-style-type: none">• Dennis Lester A.S. General Studies A.A.S. Industrial Electronics, Northeast Alabama Community College A.A.S. Water / Wastewater Mgt. & Technology, Northeast Alabama Community College A.A.S. Computer Science, Northeast Alabama Community College 38+ years' experience in Industrial Preventive/Multi-craft maintenance

How have the instructors in the program developed professionally over the past two years?

Galen Andrews:

Received Certification from FANUC in robotics. (2021)

Received Certification from Rockwell Automation for Studio 5000 Logix Designer Level 2. (2022)

Dennis Lester:

National Occupational Competency Testing Institute (NOCTI)

Teacher Assessment in Electrical Construction Technology (2016)

National Coalition of Certification Centers (NC3)

504 Multimeter Certification for Instructors (2019)

What are any planned professional development activities for instructors in the program?

Additional professional development in the student advisement area for new computer system software.

To attend the next level of training for Rockwell Automation Studio 5000 Logix Designer.

Are any additional instructors anticipated within the next five years? If so, please explain.

Not at this time.

Instructional Quality and Enhancements/Curriculum Design

How is the general education core incorporated into the course of study for this program?

The AAS Degree includes 18-19 credit hours of general education in the 63-64 total: ENG 101, SPH 107, three hours of humanities or fine arts, CIS 146, any 100 level math class, and three hours of History, Social and Behavioral Sciences.

How is curriculum of each program option evaluated to ensure it is relevant and current? Examples include advisory committee suggestions, student learning outcome evaluations, student evaluations, etc.

Advisory committee suggestions are used to evaluate curriculum.

Describe changes that have been made in the delivery of the courses in each option of the program as a result of review of the program learning outcomes over the last five years.

Mechatronics (automation) training equipment was purchased. Mechanical trainers were built to facilitate hands-on training.

Are courses in the program scheduled to maintain availability and accessibility in accordance with the college's mission? Explain.

In accordance with NACC Mission Goal 3, courses are routinely offered and made available so that students can graduate on time.

Program Resources

Describe the physical facilities and resources, including any laboratories, used in the program. Are the physical facilities and resources adequate? Explain.

Increased size of physical facilities needed.

The Industrial Systems Technology Program is housed in the following areas on campus:

TC 101 - Office

TC 105 – Motor Controls/Troubleshooting Lab

TC 110 – Lab and Classrooms for DC/AC/Solid State/Digital/Motors & Transformers/Mechanical TC 104 – Lab for Mechanical Principles

GY 102 –Wiring Lab

IC 102 – Lab and Classroom for Robotics, PLC’s, and Instrumentation

TC 108- Classroom for Motor Controls/Hydraulics/Pneumatics/ Pumps & Piping

IS 108- Classroom for PLC’s/Instrumentation/ Industrial Control, advanced PLC’s IS 107- Lab for Hydraulics/Pneumatics/Pumps & Piping

Are there any plans for major expansion or upgrade of facilities or major replacement/expansion of equipment? Explain the rationale and include projected costs.

Equipment purchases for the hands-on component of all courses are reviewed annually to provide the best learning opportunities.

There are plans to start the building of a new 50,000 square foot Technology Center in 2023.

Describe the technological resources used in the program. Are the technological resources adequate? Explain.

Mechatronics labs are equipped with equipment and instructional technology appropriate to the courses taught, including the following:

Oscilloscopes

Power supplies

Function generators

Logic probes

Digital multi meters

Fanuc Industrial robots/trainers

Vibralign, Industrial laser shaft alignment

PLC trainer and associated equipment

Instrumentation calibration equipment/trainers

Hydraulic/Pneumatic trainers

Electrical wiring materials and supplies

Laptop Computers

Multimedia equipment in each room

Hand and power tools

Hydraulic press
 Motor and pump mounting trainers
 Gear/sheave/sprocket ratio and alignment trainers
 Automation Trainer
 Tap/die/drill sets
 Specialty pullers and separators
 Motor control equipment

Are there any plans for major expansion or upgrade of technological resources? Explain the rationale and include projected costs.

The need for upgrading and replacing equipment is ongoing due to the continually changing needs of industry. Resources will be added as needed to provide current and relevant education and skills training.

Describe the library resources that are available to the program.

NACC's Learning Resources Center provides access to the following online learning resources: an online catalog, EBSCO's Discovery Service, EBSCO's *Associates Programs Source Plus* database, EBSCO's *Academic eBook Collection*, Alexander Street Press's *Academic Video Online* database, and America's News' *Newsbank* database, and the *Alabama Virtual Library*. Combined, these resources provide students and faculty with access to over 50,000 print books, 250,000 eBooks, 60 print periodicals, 24,000 online periodicals, 79,000 audiovisual materials and digital media. In addition, the LRC has over 450 laptops and hotspots for students to check out. Librarians assist students in person and via text, phone, chat, and email. Subject-specific research guides are located at <https://libguides.nacc.edu/>

Are the library resources adequate for the program? Explain.

Yes. Program-specific resources and computers are available for on or off campus use by students and faculty.

Are there any plans for expansion or upgrade of library resources for the program? Explain the rationale and include projected costs.

While library resources are currently adequate, library resources are continually being updated. The projected cost for expanding library resources in this subject is \$500.

Advisory Committee

Is an advisory committee in place for the program? If so, list the committee members and their affiliation in the community. If not, are plans in place to establish an advisory committee?

The Mechatronics Advisory Committee consists of the following members:
 Dr. David Campbell (ex officio), President NACC
 Dr. Kerry Wright (ex officio), Dean of Workforce Development, NACC
 Dennis Lester, Instructor, NACC
 Galen Andrews, Instructor, NACC
 David Hudson, WestRock, Stevenson, AL.
 Sammy Hicks, Playcore, Fort Payne, AL.
 Kenny Brown, Vulcraft, Fort Payne, AL.
 Randy King, Oval International, Fort Payne, AL.
 Reggie Lowe, Newman Technology, Albertville, AL.
 Steve Howell, Polyamide High Performance, Scottsboro, AL.
 Gary Anderson, Polyamide High Performance, Scottsboro, AL.

What is the purpose and role of the advisory committee?

The Mechatronics Advisory Committee provides a means through which local industry leaders may provide input into the development and evaluation of the industrial systems technology program.

Describe any changes that have been made to the program as a result of advisory committee activity or suggestions.

- Increased focus on Programmable Logic Controllers (PLC'S).
- Soft skills and leadership skills have been incorporated into the IST program.
- Real time work experience has been addressed with the addition of a co-op work experience for each student.

Enrollment and Completions

What are the enrollment trends in the program over the last five years?

Number of Students Majoring in Mechatronics Fall 2017 – Fall 2021

Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021
27	20	21	14	13

Source: ACCS DAX Student Headcount by Program Report. Retrieved October 11, 2022.

What are the enrollment trends in the program over the last five years by gender?

Number of Students Majoring in Mechatronics By Gender Fall 2017 – Fall 2021

	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021
Male	25	17	21	14	12
Female	2	3	-	-	1
Total	27	20	21	14	13

Source: ACCS DAX Student Headcount by Program Report. Retrieved October 11, 2022.

What are the enrollment trends in the program over the last five years by race/ethnicity?

Number of Students Majoring in Industrial Electronics Technology by Race/Ethnicity Fall 2017 – Fall 2021

	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021
African American	-	-	1	-	-
Asian	-	-	-	-	-
Hispanic	-	1	3	-	1
American Indian	-	-	-	1	-
Other	1	1	1	1	-
White	26	18	16	12	12
Total	27	20	21	14	13

Source: ACCS DAX Student Headcount by Program Report. Retrieved October 11, 2022.

What are the total number of enrollments and credit-hour production over the last five academic years?

**Total Enrollments and Credit Hour Production
Industrial Electronics (ILT) Courses
AY 2017-2018 through AY 2021-2022**

	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022
Course Enrollment	282	255	203	186	229
CHP	811	724	581	545	676

Source: NACC AS400 Database, Retrieved 2021. ACCS DAX Report Credit Hour Trend by Department, Retrieved October 11, 2022.

What are the course success and retention rates in the program over the last three academic years?*

**Course Success and Retention Rates
Industrial Electronics (ILT) Courses
Summer, Fall, and Spring Semesters 2019-2022**

	A	B	C	D	F	W	Enrollments	ABC	Success Rate
Summer 2019-Spring 2020	94	60	33	3	6	21	217	187	86.2%
Summer 2020-Spring 2021	72	61	32	10	9	6	190	165	86.8%
Summer 2021-Spring 2022	89	52	25	7	9	17	199	166	83.4%

Source: Office of Institutional Planning and Assessment, NACC Course Success and Retention Rates Reports, 2019-2022.

*Academic year is represented by summer, fall, and spring semesters.

What do the data indicate about enrollment and student retention in the program?

The data show that the number of students majoring in Mechatronics has decreased over five years.

What are the plans for increasing enrollment and retention rates in the program?

Program coordinator will work with Dean of Workforce Development to strengthen relationships with local industry and employers.

How many students have earned a credential in the program in the last five academic years?

Degrees and Certificates Conferred in Mechatronics AY 2017-2018 through AY 2021-2022					
Credential	2017- 2018	2018- 2019	2019- 2020	2020- 2021	2021- 2022
AAS Degree	6	7	4	5	5
Certificate	5	7	1	1	4
Short-Term Certificate	21	56	16	4	26

Source: ACCS DAX Report Award Summary by CIP Code, Retrieved October 11, 2022.

What are the plans for increasing the completion rates in the program?

Increased recruitment of dual enrollment students by inclusion and development of summer programs for STEM.

Hybrid course delivery methods added for students who are unable to attend class on campus due to full time employment.

Licensure passage rates

Does the program lead to the opportunity for licensure? If so, what are the licensure opportunities?
No.
What are the licensure pass rates, if applicable?
N/A
Does the program or any coursework in the program lead to any type of industry certification? If so, what are the certifications?
<p>Electronics Technicians Association (ETA) certifications: EM1, EM2, EM4 (WKO-110) NCCER Core Course National Coalition of Certification Centers (NC3), 504 Multimeter Certification</p>
What are the industry certification pass rates, if applicable?
<p>504 Multimeter Certification 92% EM 1, 2 & 4 results for Fall 2019. (prior to COVID-19 pandemic) EM1 44% EM2 33% EM4 30%</p>

Job Placement Rates and Employer Satisfaction

What are the job placement rates for graduates of the program?

As reported in the Perkins Report of 2020-2021, the Mechatronics program had an employment rate of 100%.
--

Is employer satisfaction of graduates assessed? If so, are employers satisfied with graduates of the program? Please describe.

Employer satisfaction is assessed upon the student's completion of their co-op class (ADM150/151/152). The employers have expressed satisfaction in most students completing their coop.
--

Student Follow-Up Reports

Is student satisfaction with the program assessed? If so, are students in the program satisfied with the program? Please describe.

At this time, there is no formal assessment of student satisfaction.
--

Is alumni satisfaction with the program assessed? If so, are alumni of the program satisfied with the program? Please describe.
--

Not at this time. The Office of Institutional Planning and Assessment is currently revising all Alumni survey components.

Findings of Review

What are the strengths of the program?
The Mechatronics program has moved from older equipment and Textbooks to up to date equipment and Textbooks. We are utilizing this equipment to teach what is relevant for the modern-day Mechatronics Technician.
What are recommendations for improvement?
<p>*To keep working on the structure of the online use of Canvas Courses that were basically pencil and paper test.</p> <p>*To add a course for Industrial Sensors.</p> <p>* Continue receiving recommendations from industry and upgrading equipment accordingly to facilitate the student’s exposure to modern manufacturing techniques. Add additional lab and classroom space.</p>
Please provide any other findings that are pertinent to the review.
N/A

Report Affirmed by:

Signed:	Date:
Signatures on file in the Office of Institutional Planning and Assessment	
Galen Signe	
Kerry Signe	
Dr. Da Signe	
Kelly Black, Chair of the Curriculum Committee	