

Mechatronics Engineering Technology

The Mechatronics Engineering Technology curriculum prepares individuals for employment as technicians in engineering fields requiring electrical, mechanical and computer skills. Mechatronics Engineering technicians assist in designing, developing, testing, process design and improvement, troubleshooting and repair of complex engineering and manufacturing systems. Emphasis is placed on the integration of theory and hands-on application of engineering principles.

In addition to coursework in engineering fundamentals, basic manufacturing, electricity, computers, mathematics and physics, students develop their critical thinking, planning, problem solving, oral and written communications.

Graduates of the curriculum will find employment opportunities in industrial maintenance and manufacturing including assembly, testing, start-up, troubleshooting, repair and upgrades of machinery and the associated control system. Graduates will be eligible to take the exam for the Siemens Mechatronics Level 1, Siemens Mechatronics Level 2, PMMI Mechatronics Certifications and others as added.

For more details about Central Piedmont Mechatronics visit cpcc.edu/et/mechatronics.

For specific information about potential positions and wages in Mechatronics Engineering Technology employment, visit the Central Piedmont Career Coach (<https://cpcc.emsic.com/programs/mechatronics-engineering-technology-academic-program-for-credit/198260?radius=®ion=50%20Mile%20Radius>) website.

Mechatronics Engineering Technology (A40350)

Degree Awarded

The Associate in Applied Science Degree-Mechatronics Engineering Technology is awarded by the College upon completion of this program.

Admissions

- A high school diploma or equivalent is required. High schools students preparing for an engineering technology program should complete courses in algebra, geometry and advanced mathematics. Skills and proficiencies should be developed in writing, computer literacy and science.
- Placement tests in English and mathematics determine the entry-level courses that match individual needs. Developmental Studies English and mathematics courses are available for students to build basic skills and knowledge.
- A counseling/orientation appointment follows placement testing.
- Many courses have prerequisites or co-requisites; check the Courses section for details.

Notes

The Mechatronics Engineering Technology curriculum at Central Piedmont provides a basic background in mechanical, electrical and computer skills and, depending on the track, specialized instruction in each of these areas. Topics include CAD, basic computer skills, safety,

automation, programmable logic controllers, instrumentation, hydraulics and pneumatics, mechanical drives, motors and controls, and basic electricity. The latest equipment is used to provide skills in these areas.

Two curriculum tracks are available: the Mechanical track and the Electrical track. The Mechanical Track is structured to enable the graduate to focus on the mechanical aspects of a manufacturing or designed system while still having a good understanding of its electrical function. The Electrical Track provides the opposite – a focus on the electrical and control aspects with a good understanding of the mechanical components.

Completion of the program requires that students use college-level algebra, trigonometry and physics in the application of scientific principles to technical problems.

Contact Information

The Mechatronics Engineering Technology Program is in the Engineering Technologies Division. For additional information, visit the Engineering Technologies Division (<http://www.cpcc.edu/et>) website or call the Engineering Technologies Division at 704.330.6860.

General Education Requirements

ENG 111	Writing and Inquiry	3.0
COM 110	Introduction to Communication	3.0
ECO 251	Principles of Microeconomics	3.0
Take 1 of the following:		3.0
ENG 112	Writing and Research in the Disciplines	3.0
or ENG 113	Literature-Based Research	
or ENG 114	Professional Research & Reporting	
Take 1 of the following:		3.0
MAT 121	Algebra/Trigonometry I	3.0
or MAT 171	Precalculus Algebra	
Take 1 of the following:		3.0
ART 111	Art Appreciation	3.0
or ART 114	Art History Survey I	
or ART 115	Art History Survey II	
or HUM 120	Cultural Studies	
or HUM 130	Myth in Human Culture	
or MUS 110	Music Appreciation	
or MUS 112	Introduction to Jazz	
or PHI 215	Philosophical Issues	
or PHI 240	Introduction to Ethics	
or REL 110	World Religions	

Major Requirements

PHY 131	Physics-Mechanics	4.0
or PHY 151	College Physics I	
ISC 112	Industrial Safety	2.0
EGR 125	Appl Software for Tech	2.0
MEC 130	Mechanisms	3.0
MEC 265	Fluid Mechanics	3.0
ELC 130	Advanced Motors and Controls	3.0
ELC 131	Circuit Analysis I	4.0
ATR 112	Introduction to Automation	3.0
ELC 213	Instrumentation	4.0
ELN 260	Prog Logic Controllers	4.0
PCI 173	Programmable Systems	4.0

or PCI 170	DAQ and Control	
DFT 154	Intro to Solid Modeling	3.0
ISC 212	Metrology	2.0
MEC 110	Introduction to CAD/CAM	2.0
or MAC 121	Introduction to CNC	
MEC 180	Engineering Materials	3.0
WBL 111	Work-Based Learning I	1.0
or MEC 161	Manufacturing Processes I	
MEC 210	Applied Mechanics	3.0
Total Credits		68

No diplomas are offered in Mechatronics Engineering Technology.

Mechatronics Engineering Technology Certificates (C40350)

Mechatronics Engineering Technology Certificate Specialization in Mechatronics Engineering Pathway (C40350-C5)

This certificate is available to high school students enrolled in Career and College Promise.

Major Requirements

MAT 121	Algebra/Trigonometry I	3.0
EGR 125	Appl Software for Tech	2.0
ISC 112	Industrial Safety	2.0
ELC 131	Circuit Analysis I	4.0
ELC 130	Advanced Motors and Controls	3.0
Total Credits		14

MEC 110. Introduction to CAD/CAM. 2.0 Credits. Class-1.0. Clinical-0.0. Lab-2.0. Work-0.0

This course introduces CAD/CAM. Emphasis is placed on transferring part geometry from CAD to CAM for the development of a CNC-ready program. Upon completion, students should be able to use CAD/CAM software to produce a CNC program.

Prerequisites: Take DFT 154

MEC 111. Machine Processes I. 3.0 Credits. Class-1.0. Clinical-0.0. Lab-4.0. Work-0.0

This course introduces shop safety, hand tools, machine processes, measuring instruments, and the operation of machine shop equipment. Topics include use and care of tools, safety, measuring tools, and the basic setup and operation of common machine tools. Upon completion, students should be able to manufacture simple parts to specified tolerance.

MEC 130. Mechanisms. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course introduces the purpose and action of various mechanical devices. Topics include cams, cables, gear trains, differentials, screws, belts, pulleys, shafts, levers, lubricants, and other devices. Upon completion, students should be able to analyze, maintain, and troubleshoot the components of mechanical systems.

MEC 155. Environmentally Benign Manufacturing. 3.0 Credits.

Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course introduces environmental issues involving the generation and management of hazardous materials and wastes in manufacturing operations. Topics include the analysis of manufacturing trends, pollution minimization strategies, and the advantages of incorporating a sustainable approach to manufacturing. Upon completion, students should be able to discuss analysis and modification of industrial processes in manufacturing facilities toward a sustainable end.

MEC 161. Manufacturing Processes I. 3.0 Credits. Class-3.0.

Clinical-0.0. Lab-0.0. Work-0.0

This course provides the fundamental principles of value-added processing of materials into usable forms for the customer. Topics include material properties and traditional and non-traditional manufacturing processes. Upon completion, students should be able to specify appropriate manufacturing processing for common engineering materials.

MEC 172. Introduction to Metallurgy. 3.0 Credits. Class-2.0.

Clinical-0.0. Lab-2.0. Work-0.0

This course covers the production, properties, testing, classification, microstructure, and heat-treating effects of ferrous and non-ferrous metals. Topics include the iron-carbon phase diagram, ITT diagram, ANSI code, quenching, senescing, and other processes concerning metallurgical transformations. Upon completion, students should be able to understand the iron-carbon phase diagram, ITT diagram, microstructure images, and other phenomena concerning the behavior of metals.

MEC 180. Engineering Materials. 3.0 Credits. Class-2.0. Clinical-0.0.

Lab-3.0. Work-0.0

This course introduces the physical and mechanical properties of materials. Topics include materials testing, pre- and post-manufacturing processes, and material selection of ferrous and non-ferrous metals, plastics, composites, and non-conventional materials. Upon completion, students should be able to utilize basic material property tests and select appropriate materials for applications. This course covers the physical and mechanical properties of materials. Topics include testing, heat treating, ferrous and non-ferrous metals, plastics, composites, and material selection. Upon completion, students should be able to specify basic tests and properties and select appropriate materials on the basis of specific properties.

Prerequisites: Take ENG 111 ENG 112 or ENG 113

MEC 210. Applied Mechanics. 3.0 Credits. Class-2.0. Clinical-0.0.

Lab-2.0. Work-0.0

This course is a study of forces, stresses, and strains acting upon mechanical components. Topics include static equilibrium; normal, shear, and bending stresses; mathematical and graphical solution techniques; and the relationship between stress and strain. Upon completion, students should be able to demonstrate proficiency in analyzing the forces, stresses, and strains common to applications in the workplace.

Prerequisites: Take PHY 131 PHY 151 or PHY 251

MEC 260. Fundamentals of Machine Design. 3.0 Credits. Class-2.0.

Clinical-0.0. Lab-3.0. Work-0.0

This course introduces the fundamental principles of machine design. Topics include simple analysis of forces, moments, stresses, strains, friction, kinematics, and other considerations for designing machine elements. Upon completion, students should be able to analyze machine components and make component selections from manufacturers' catalogs.

Prerequisites: Take MEC 180

Take MEC 210

Take DFT 154 or DFT 170

Corequisites: Take MEC 130

MEC 265. Fluid Mechanics. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course covers the physical behavior of fluids and fluid systems. Topics include fluid statics and dynamics, laminar and turbulent flow, Bernoulli's Equation, components, applications, and other related topics. Upon completion, students should be able to apply fluid power principles to practical applications.

Prerequisites: Take PHY 131 PHY 151 or PHY 251

MEC 267. Thermal Systems. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course introduces the fundamental laws of thermodynamics. Topics include work and energy, open and closed systems, and heat engines. Upon completion, students should be able to demonstrate a knowledge of the laws and principles that apply to thermal power.

Prerequisites: Take One: PHY 131 or PHY 151

MEC 270. Machine Design. 4.0 Credits. Class-3.0. Clinical-0.0. Lab-3.0. Work-0.0

This course covers the basic principles underlying design and selection of machine elements. Topics include stress analysis, selection of components, power transmission, and other design considerations. Upon completion, students should be able to identify and solve mechanical design problems by applying basic engineering principles.

Prerequisites: Complete one of the following options: Take EGR 250
Take EGR 251 and EGR 252

MEC 275. Engineering Mechanisms. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course covers plane motion and devices used to generate plane motion. Topics include analysis of displacement, velocity, acceleration, gears, cams, and other mechanical systems. Upon completion, students should be able to graphically and mathematically analyze a plane motion system.

Prerequisites: Take PHY 131 PHY 151 or PHY 251
Take MAT 122 or MAT 172

MEC 292. Selected Topics in Mechanical Engineering Technology. 2.0 Credits. Class-1.0. Clinical-0.0. Lab-2.0. Work-0.0

MEC 293. Selected Topics in Mechanical Engr. Tech Engineering Technology. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0