



Apprenticeship Montgomery
Montgomery Community College

2017



1011 Page Street • Troy, NC 27371 • 910-898-9674

www.montgomery.edu

Montgomery Community College is an equal opportunity institution.

Apprenticeship Montgomery



Apprenticeship Montgomery: What is it?

Montgomery Community College is partnering with Montgomery County Schools, Montgomery Economic Development Corporation (EDC), Montgomery County NC Works Career Center, NC Dept. of Commerce (Apprenticeship and Training), and most importantly, local employers to build an apprenticeship program to meet the long-term workforce needs in the county.

Apprenticeship Montgomery targets high school students enrolled in Career and Technical Education (CTE) pathways during their junior and senior years and places them in college level courses while they complete their high school requirements. At the same time, these individuals are placed with employers in job shadowing positions until they are eligible to work as operators. At the end of this five year program, successful apprentices will have a high school diploma, a National Career Readiness Certificate, a college level certificate in Electrical Systems Technology, designation as a Certified Production Technician, a journeyman's (apprenticeship) credential, and an Associate of Applied Science Degree in Industrial Systems Technology. Additionally, the apprentice will have gained 8,000 hours or four to five years' experience in the workplace.

Apprenticeship Montgomery offers motivated high school CTE students a clear, focused, and affordable path to future success, allowing them to get a head start on their career and college preparation. Through Apprenticeship Montgomery, successful applicants have the opportunity to enroll – tuition free – in community college courses that lead to a certificate, diploma, or degree as well as provide entry-level job skills. Participating employers have committed to pay all associated costs for their apprentices. Academic credits earned will enable students who continue into postsecondary education after high school graduation to complete a postsecondary credential in less time than would normally be required.

What are the apprenticeship pathways available at Montgomery Community College?

- **Industrial Systems Technology**– This program is designed to prepare individuals to safely service, maintain, repair, or install equipment. Instruction includes theory and skill training needed for inspecting, testing, troubleshooting, and diagnosing industrial systems. Apprentices will learn multi-craft technical skills in print reading, mechanical systems maintenance, electricity, hydraulics/pneumatics, welding, machining or fabrication, and various diagnostic and repair procedures. Practical application in these industrial systems are emphasized and additional advanced course work is offered. Apprentices train with local employers with the goal of moving into maintenance field.

*** Currently, Industrial Systems Technology is the only pathway offered through Apprenticeship Montgomery. However, Apprenticeship Montgomery is designed to be able to add future pathways based on employer needs. Montgomery Community College and the Apprenticeship Montgomery Leadership Team are always seeking opportunities to add pathways and employer partners. **If interested in becoming a participating employer or introducing another pathway, please call (910) 898-9674.***

Who can apply to Apprenticeship Montgomery?

- NC high school juniors and seniors who are enrolled in an accredited high school educational program can apply to Apprenticeship Montgomery.
 - Applicants must have an acceptable attendance record at their high school, the recommendation of their instructors, and parental support and commitment.
 - Must have recommendation of current year's teacher to speak to the applicant's work ethic and ability

- Must be reading at or above a 10th grade level as evidenced by a standardized test score
- Must have math score at or above a 9th grade level as evidenced by a standardized test score
- Must satisfy the employer panel interview for admission
- Must have all employment documentation: work permit, valid Driver's License or valid state-issued identification card, and Social Security Card.
- Montgomery Community College students who are enrolled in a skilled trades program
- Military Veterans
- Members of the North Carolina National Guard

What are the costs?

Participating employers cover all costs for Apprenticeship Montgomery. Costs covered by the employers are: apprentice earnings and taxes, class registration fees, tuition costs, books, supplies, and tools.

Requirements of the Program

To remain in the program, apprentices must meet the requirements as set by their high school, their employer, and the College. Students participating in the program will sign a waiver to allow information to be shared with all of the Apprenticeship Montgomery Program partners.

Apprentice Responsibilities

- Must adhere to all company policies and remain an employee in good standing with the company
- Must provide own transportation to both College campus and work site
- Must adhere to attendance policies at the College and at the work site
- Must provide proof to the College of continued progress toward high school completion on a semester basis
- Must maintain a grade of "C" or better in all college level courses
- Must attend at least 80% of each course offered through the Apprenticeship Montgomery Program to maintain good standing in the program

Company Responsibilities

- Assign qualified Journeyman/Skilled Trainer for each apprentice
- Have on file documented competencies/certifications of each instructor/trainer
- Ensure the apprentice is supervised on the job
- Ensure the apprentice performs job-related tasks based on hours designated by function
- Evaluate on-the-job training & job-related education
- Complete & maintain all documentation required for each apprentice
- Work closely with high school/MCC representatives—document attendance, review student grades/performance/associated records

What are the courses required for Apprenticeship Montgomery?

College coursework for Apprenticeship Montgomery is related to the on-the- job training apprentices receive with their sponsoring employer. For high school apprentices this is in addition to their high school schedule. Apprentices begin the pre-apprenticeship portion of the program during the summer and should complete their designated pre-apprentice courses within one year. These courses include the Certified Production Technician course and Introduction to Welding, both offered through the Continuing Education Department at the College. After completion of the pre-apprenticeship, the apprentices are considered fulltime college students and will work with their sponsoring employers to balance both their academic and on-the- job training schedules as they begin the Industrial Systems Technology program.

The course schedule listed below is for reference only. Once the prerequisite courses are completed, apprentices are to work with their high school and or college counselors in determining when to take the remaining courses. Apprentices can enroll for as few as one curriculum course per semester and as many as three curriculum courses per semester, but must complete the pre- apprenticeship courses before beginning other coursework.

First Summer Semester (Pre-Apprenticeship):

- MNT 3111- Certified Production Technician
- Work with employer

First Fall Semester (Pre-Apprenticeship):

- WLD 3106- Introduction to Welding
- Work with employer

First Spring Semester (Pre-Apprenticeship):

- WLD 3106- Introduction to Welding
- Work with employer

Courses Required to Complete Apprenticeship Montgomery Program (Industrial Systems Technology Degree):

- ELC 112- DC/AC Part A
- ELC 112- DC/AC Part B
- ELC 113- Residential Wiring I
- ELC 115- Industrial Wiring
- ELC 117- Motors and Controls
- ELC 119- NEC Calculations
- ELC 126- Electrical Computations
- ELC 128- Introduction to Programmable Logic Controls (PLC)
- ELN 229- Industrial Electronics
- ENG 111- Writing and Inquiry
- ENG 112- Writing/Research in the Disc
- BPR 111- Blueprint Reading
- HYD 110- Hydraulics/ Pneumatics I
- HYD 180- Fluid Power in Automation
- ISC 110- Workplace Safety
- MAT 121- Algebra/ Trigonometry I
- MEC 111- Machine Processes I
- MEC 130- Mechanisms
- MNT 110-Introduction to Maintenance Procedures
- MNT 111- Maintenance Practices
- AHR 120- HVAC Maintenance
- CIS 111- Basic PC Literacy or CIS 110- Introduction to Computers
- Humanities/ Fine Arts course
- Social/ Behavioral Science course

How many times can an apprentice take a course?

While an apprentice can retake a course as many times as he/she needs to make a passing score, sponsoring employers will pay for a course **only once**. Apprentices whose attendance falls below 80% or whose test scores do not meet the course's passing requirements are required to reimburse their employer for all course costs. The repayment to the employer will be made through payroll deduction at the work site. For this reason, apprentices are required to share progress reports with their employer on a semester basis.

Certified Production Technician (MNT 3111)

The Production Technician course provides the student the foundational, portable production knowledge-set applicable to entry-level production technician jobs in the manufacturing industry.

Introduction to Welding (WLD 3106)

This course is designed to teach the fundamentals of welding and cutting. This course covers safety, oxy-acetylene welding, torch cutting, arc welding, MIG and TIG welding. By the end of the course students will have entry-level knowledge of the welding process.

*****SPECIAL MATERIALS/SUPPLIES NEEDED:*** *Students/Employees will need to purchase welding gear to perform the essential objectives of the course. A detailed gear list will be provided to the students on the first day of class.*

Course Standards:

- The class is structured for more hands-on practice (90%) than lecture/discussion (10%). However, each topic area does involve some class lecture/discussion. Additionally, evaluation requires critique and troubleshooting with students on a class and individual basis.



Apprenticeship Montgomery

Apprenticeship Course Descriptions

	Class Hours	Lab/Clinical Hours	Credit Hours
<p>AHR 120 HVAC Maintenance 1 3 2</p> <p>Prerequisites:</p> <p>Corequisites:</p> <p>This course introduces the basic principles of industrial air conditioning and heating systems. Emphasis is placed on preventive maintenance procedures for heating and cooling equipment and related components. Upon completion, students should be able to perform routine preventive maintenance tasks, maintain records, and assist in routine equipment repairs.</p>			
<p>BPR 111 Blueprint Reading 1 2 2</p> <p>Prerequisites:</p> <p>Corequisites:</p> <p>This course introduces the basic principles of print reading. Topics include line types, orthographic projections, dimensioning methods, and notes. Upon completion, students should be able to interpret basic prints and visualize the features of a part or system.</p> <p>Competencies- Student Learning Outcomes</p> <ol style="list-style-type: none"> 1. Interpret symbols, abbreviations, and line types. 2. Identify and describe types of projection and use of views. 3. Draw freehand sketches. 4. Calculate measurements of features. 5. Identify and interpret dimensioning and tolerancing. 			
<p>CIS 110 Introduction to Computers 2 2 3</p> <p>Prerequisites:</p> <p>Corequisites:</p> <p>This course introduces computer concepts, including fundamental functions and operations of the computer. Topics include identification of hardware components, basic computer operations, security issues, and use of software applications. Upon completion, students should be able to demonstrate an understanding of the role and function of computers and use the computer to solve problems. <i>This course has been approved for transfer under the CAA as a general education course in Mathematics (Quantitative). This course has been approved for transfer under the ICAA as a general education course in Mathematics (Quantitative).</i></p>			
<p>*CIS 111 Basic PC Literacy 1 2 1</p> <p>Prerequisites:</p> <p>Corequisites:</p> <p>This course provides an overview of computer concepts. Emphasis is placed on the use of personal computers and software applications for personal and fundamental workplace use. Upon completion, students should be able to demonstrate basic personal computer skills.</p>			
<p>ELC 112 DC/AC Electricity (Part A & B) 3 6 5</p> <p>Prerequisites:</p> <p>Corequisites:</p> <p>This course introduces the fundamental concepts of and computations related to DC/AC electricity. Emphasis is placed on DC/AC circuits, components, operation of test equipment; and other related topics. Upon completion, students should be able to construct, verify, and analyze simple DC/AC circuits.</p> <p>Competencies – Student Learning Outcomes</p> <ol style="list-style-type: none"> 1, Demonstrate safe practices and procedures with tools, materials and industry accepted test equipment covered in the course. 2. Demonstrate appropriate use of test equipment, evaluate circuit performance and apply appropriate troubleshooting techniques to electrical circuits. 3. Construct and analyze series, parallel and combinations circuits using appropriate components. 4. Use appropriate laws and formulas to perform circuit calculations. 			

5. Interpret electrical schematics.
6. Describe the characteristics of various power sources.

	Class Hours	Lab/Clinical Hours	Credit Hours
ELC-113 Residential Wiring I	2	6	4

Prerequisites:

Corequisites:

This course introduces the care/usage of tools and materials used in electrical installations and the requirements of the National Electrical Code. Topics include NEC, electrical safety, and electrical blueprint reading; planning, layout; and installation of electrical distribution equipment; lighting; overcurrent protection; conductors; branch circuits; and conduits. Upon completion, students should be able to properly install conduits, wiring, and electrical distribution equipment associated with residential electrical installations.

Competencies – Student Learning Outcomes

1. Identify and demonstrate safe practices and procedures with tools, materials and industry accepted test equipment covered in the course.
2. Demonstrate appropriate use of test equipment, evaluate circuit performance and apply appropriate troubleshooting techniques to residential electrical circuits.
3. Draw, plan and interpret electrical plans and symbols used in residential applications.
4. Identify, size, and install wiring and electrical distribution equipment and devices associated with residential electrical installations in accordance with the National Electrical Code.
5. Recognize and demonstrate appropriate use of tools and materials that are used in residential wiring.

ELC 115 Industrial Wiring	2	6	4
----------------------------------	----------	----------	----------

Prerequisites:

Corequisites:

This course covers layout, planning, and installation of wiring systems in industrial facilities. Emphasis is placed on industrial wiring methods and materials. Upon completion, students should be able to install industrial systems and equipment.

Competencies-Student Learning Outcomes

1. Identify and demonstrate safe practices and procedures with tools, materials and industry accepted test equipment covered in the course.
2. Demonstrate appropriate use of test equipment, evaluate circuit performance and apply appropriate troubleshooting techniques to industrial electrical circuits.
3. Draw, plan, and interpret electrical plans and symbols used in industrial applications.
4. Identify, size, and install wiring and electrical distribution equipment and devices associated with industrial electrical installations in accordance with the National Electrical Code.
5. Recognize and demonstrate appropriate use of tools and materials that are used in industrial wiring.

ELC 117 Motors & Controls	2	6	4
--------------------------------------	----------	----------	----------

Prerequisites:

Corequisites:

This course introduces the fundamental concepts of motors and motor controls. Topics include ladder diagrams, pilot devices, contactors, motor starters, motors, and other control devices. Upon completion, students should be able to properly select, connect, and troubleshoot motors and control circuits.

Competencies – Student Learning Outcomes

1. Demonstrate safe practices and procedures with tools, materials and industry accepted test equipment covered in the course.
2. Demonstrate appropriate use of test equipment, evaluate circuit performance and apply appropriate troubleshooting techniques to control circuits.
3. Interpret and use ladder and wiring diagrams, symbols, and schematics.
4. Demonstrate and describe the use of relays, contactors, motor starters and pilot devices in electrical control circuits.
5. Describe principles and operations related to electrical control circuits.
6. Describe the concepts of rotating electrical machinery.

Class Hours	Lab/Clinical Hours	Credit Hours
----------------	-----------------------	-----------------

ELC 119 NEC Calculations**1****2****2**

Prerequisites:

Corequisites:

This course covers branch circuit, feeder, and service calculations. Emphasis is placed on sections of the National Electrical Code related to calculations. Upon completion, students should be able to use appropriate code sections to size wire, conduit, and overcurrent devices for branch circuits, feeders, and service.

ELC 126 Electrical Computations**2****2****3**

Prerequisites:

Corequisites:

This course introduces the fundamental applications of mathematics which are used by an electrical/electronics technician. Topics include whole numbers, fractions, decimals, powers, roots, simple electrical formulas, and usage of a scientific calculator. Upon completion, students should be able to solve simple electrical mathematical problems.

ELC 128 Introduction to PLC**2****3****3**

Prerequisites:

Corequisites:

This course introduces the programmable logic controller (PLC) and its associated applications. Topics include ladder logic diagrams, input/output modules, power supplies, surge protection, selection/installation of controllers, and interfacing of controllers with equipment. Upon completion, students should be able to understand basic PLC systems and create simple programs.

Competencies- Student Learning Outcomes

1. Identify and demonstrate safe practices and procedures with tools, materials and industry accepted test equipment covered in the course.
2. List and describe the hardware components used in PLC systems.
3. Utilize numbering systems as applied to PLCs.
4. Demonstrate and describe the use of various PLC instruction sets.
5. Create various simple PLC programs using the appropriate instruction set.
6. Apply appropriate troubleshooting methods to PLCs.

ELN 229 Industrial Electronics**3****3****4**

Prerequisites:

Corequisites:

This course covers semiconductor devices used in industrial applications. Topics include the basic theory, application, and operating characteristics of semiconductor devices. Upon completion, students should be able to construct and/or troubleshoot these devices for proper operation in an industrial electronic circuit.

Competencies-Student Learning Outcomes

1. Identify and demonstrate safe practices and procedures with tools, materials and industry accepted test equipment covered in the course.
2. Demonstrate appropriate use of test equipment, evaluate circuit performance and apply appropriate troubleshooting techniques to semiconductor devices.
3. Describe the properties and operation of semiconductors.
4. Identify the schematic symbols associated with semiconductor devices.
5. Construct and analyze operational circuits using semiconductor devices.

ENG 111 Writing and Inquiry**3****0****3**

Prerequisites:

Corequisites:

This course is designed to develop the ability to produce clear writing in a variety of genres and formats using a recursive process. Emphasis includes inquiry, analysis, effective use of rhetorical strategies, thesis development, audience awareness, and revision. Upon completion, students should be able to produce unified, coherent, well-developed essays using standard written English.

Competencies- Student Learning Outcomes

1. Demonstrate writing as a recursive process.
2. Demonstrate writing and inquiry in context using different rhetorical strategies to reflect, analyze, explain, and persuade in a variety of genres and formats.
3. Students will reflect upon and explain their writing strategies.
4. Demonstrate the critical use and examination of printed, digital, and visual materials.

5. Locate, evaluate, and incorporate relevant sources with proper documentation.
6. Compose texts incorporating rhetorically effective and conventional use of language.
7. Collaborate actively in a writing community.

	Class Hours	Lab/Clinical Hours	Credit Hours
ENG 112 Writing/ Research in Disc	3	0	3
Prerequisites: ENG 111			
Corequisites:			
This course, the second in a series of two, introduces research techniques, documentation styles, and writing strategies. Emphasis is placed on analyzing information and ideas and incorporating research findings into documented writing and research projects. Upon completion, students should be able to evaluate and synthesize information from primary and secondary sources using documentation appropriate to various disciplines.			
HYD 110 Hydraulics/ Pneumatics I	2	3	3
Prerequisites:			
Corequisites:			
This course introduces the basic components and functions of hydraulic and pneumatic systems. Topics include standard symbols, pumps, control valves, control assemblies, actuators, FRL, maintenance procedures, and switching and control devices. Upon completion, students should be able to understand the operation of a fluid power system, including design, application, and troubleshooting.			
Competencies- Student Learning Outcomes			
<ol style="list-style-type: none"> 1. Identify and demonstrate safe practices and procedures with tools, materials and industry accepted test equipment covered in the course. 2. Demonstrate appropriate use of test equipment, evaluate circuit performance and apply appropriate troubleshooting techniques to fluid power systems. 3. Identify components of fluid power systems using symbols and schematics. 4. Assemble a fluid power system. 5. Calculate and demonstrate the basic physics of fluid mechanics. 			
HYD 180 Fluid Power in Automation	2	3	3
Prerequisites:			
Corequisites:			
This course introduces the basic components and functions of hydraulic and pneumatic systems and their application to automated machinery. Topics include standard symbols, compressors, control valves, control circuits, actuators, maintenance procedures, switching and control devices as applied to automated machinery. Upon completion, students should be able to demonstrate an understanding of the operation of hydraulic fluid and compressed air and vacuum systems including design, troubleshooting, and applications.			
ISC 110 Workplace Safety	1	0	1
Prerequisites:			
Corequisites:			
This course introduces the basic concepts of workplace safety. Topics include fire, ladders, lifting, lock-out/tag-out, personal protective devices, and other workplace safety issues related to OSHA compliance. Upon completion, students should be able to demonstrate an understanding of the components of a safe workplace.			
MAT 121 Algebra/ Trigonometry I	2	2	3
Prerequisites: DMA-010, DMA-020, DMA-030, DMA-040, DMA-050, DMA-060			
Corequisites:			
This course provides an integrated approach to technology and the skills required to manipulate, display, and interpret mathematical functions and formulas used in problem solving. Topics include the properties of plane and solid geometry, area and volume, and basic proportion applications; simplification, evaluation, and solving of algebraic equations and inequalities and radical functions; complex numbers; right triangle trigonometry; and systems of equations. Upon completion, students will be able to demonstrate the ability to use mathematics and technology for problem-solving, analyzing and communicating results.			

Competencies- Student Learning Outcomes

1. Use geometric principles to solve industrial application problems involving perimeter, area, and volume.
2. Employ basic algebraic operations to simplify, evaluate, and solve proportions, radical and other algebraic functions, equations, and inequalities.
3. Perform basic algebraic operations involving complex numbers.
4. Solve applied problems using trigonometric principles involving right triangles.
5. Solve applied problems using systems of equations involving two and three variables. Use technology to solve practical problems and communicate results.

	Class Hours	Lab/Clinical Hours	Credit Hours
MEC 111- Machine Processes I	1	4	3
Prerequisites:			
Corequisites:			
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	2	2	3
Prerequisites:			
Corequisites:			
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.			

MNT 110- Introduction to Maintenance Procedures	1	3	2
Prerequisites:			
Corequisites:			
This course covers basic maintenance fundamentals for power transmission equipment. Topics include equipment inspection, lubrication, alignment, and other scheduled maintenance procedures. Upon completion, students should be able to demonstrate knowledge of accepted maintenance procedures and practices according to current industry standards.			

Competencies- Student Learning Outcomes

1. Identify and demonstrate safe practices and procedures with tools, materials and industry accepted test equipment covered in the course.
2. Identify and demonstrate use of hand tools.
3. Identify grades of bolts and fasteners and demonstrate proper tightening techniques.
4. Describe the operation of and assemble mechanical power transmissions and systems.
5. Identify bearings, seals, gaskets, and packing material and demonstrate appropriate assembly techniques.
6. Perform preventative and predictive maintenance and mechanical troubleshooting.

MNT 111- Maintenance Practices	2	2	3
Prerequisites:			
Corequisites:			
This course provides in-depth theory and practical applications relating to predictive and preventive maintenance programs. Emphasis is placed on equipment failure analysis, maintenance management software, and techniques such as vibration and infrared analysis. Upon completion, students should be able to demonstrate an understanding of modern analytical and documentation methods.			

	Class Hours	Lab/Clinical Hours	Credit Hours
PSY 150 General Psychology	3	0	3
Prerequisites:			
Corequisites:			

This course provides an overview of the scientific study of human behavior. Topics include history, methodology, biopsychology, sensation, perception, learning, motivation, cognition, abnormal behavior, personality theory, social psychology, and other relevant topics. Upon completion, students should be able to demonstrate a basic knowledge of the science of psychology. *This course has been approved for transfer under the CAA as a general education course in Social/Behavioral Sciences. This course has been approved for transfer under the ICAA as a general education course in Social/Behavioral Sciences.*

**Courses marked by an asterisk (*) denote “for credit” courses that may have a non-credit to credit course option or a for credit course alternative.*

What do the apprentices earn in wages?

Time Frame	Wage
Pre-Apprenticeship	\$7.25
First Year	\$8.00
Second Year	\$8.50
Third Year	\$9.25
<i>*Bonuses may apply in certain circumstances</i>	

Apprenticeship Montgomery

For more information . . .

Contact:

Andrew Gardner

Director of Business & Industry Services
Montgomery Community College
910.898.9674
gardnera@montgomery.edu

Employer Partners

American Axle and Manufacturing
Jordan Lumber Company
McRae Industries, Inc.
Unilin
KM Machine
PaperWorks

Other Partners

Montgomery Community College
NC Department of Commerce
Montgomery County Schools
Montgomery NC Works Career Center
Montgomery Economic Development Corporation