

# ELECTROMECHANICAL TECHNOLOGY (620)

## 620-101 - DC Circuits

Introduces the theory of basic DC electrical circuits. Emphasis is placed on testing of basic electrical circuits and verification of the theory involved in electronic technology. Troubleshooting practices are emphasized. Hands-on laboratory exercises and instrumentation reinforce theoretical concepts. This course supports the DC state standard for electronics. (Prerequisite: Completion of or concurrent enrollment in 804-195 College Algebra with Applications) Credit for Prior Learning Available

3 Credit hours

36 Lecture hours

36 Lab hours

## 620-102 - AC Circuits

Presents the scientific foundation used throughout electronics technology. This course supports the AC state standard for electronics. Troubleshooting practices are emphasized, and computer technologies are used to enhance perception of the abstract. Hands-on laboratory exercises and instrumentation will reinforce theoretical concepts. (Prerequisite: Completion of or concurrent enrollment in 620-101 DC Circuits) Credit for Prior Learning Available

3 Credit hours

36 Lecture hours

36 Lab hours

## 620-103 - Semi-Conductor Devices

Focuses on the testing and application of semiconductors used in electronic circuits such as power supplies and motor drives. Analyzes various types of diodes, transistors and optoelectronic devices. Hands-on evaluation and testing of electronic circuits and use of laboratory test equipment, such as oscilloscopes and digital multimeters, is emphasized in the lab. (Prerequisites: 620-102 AC Circuits; Completion of or concurrent enrollment in 103-159 Computer Literacy – Microsoft Office; 890-101 College 101) Credit for Prior Learning Available

3 Credit hours

36 Lecture hours

36 Lab hours

## 620-104 - Digital Electronics

Presents Boolean algebra, combinational logic circuit analysis and design, flip-flop arithmetic circuits, counters, digital IC logic families, data-handling logic circuits, I/O techniques, and memory devices. (Prerequisite: 620-102 AC Circuits) Credit for Prior Learning Available

3 Credit hours

36 Lecture hours

36 Lab hours

## 620-105 - Industrial Hydraulics and Pneumatics 1

Provides students with the fundamentals of fluid power (hydraulic and pneumatic) and considerable literacy in the principles of pneumatics and hydraulics. Students will attain an understanding of basic pneumatic principles and practical circuits by applying recently learned principles. The course is intended to gain a general understanding of components and terminology as well as principles and functions. This course emphasizes recognizing fluid power components, component symbols, units, equations, and terminology. Credit for Prior Learning Available

2 Credit hours

18 Lecture hours

36 Lab hours

## 620-106 - Industrial Hydraulics and Pneumatics 2

Teaches the concepts of components and system applications. Students will learn industry-relevant skills related to new topics including operation, installation, performance analysis, and design. These topics include system design, circuit applications, component operation/installation, cylinder types and mountings, rapid traverse slow feed circuits, cylinder sequencing, remote pressure control, pump unloading circuits, heat exchangers, fluid conductors, fluid conditioning, filtration, system design, and maintenance. (Prerequisite: 620-105 Industrial Hydraulics and Pneumatics 1) Credit for Prior Learning Available

3 Credit hours

36 Lecture hours

36 Lab hours

## 620-108 - Basic Hydraulics and Pneumatics

Emphasizes forms of power transmission used in industry. Force and time capabilities for fluid power systems are determined. Develops skills needed to determine directional control valves to use with hydraulic pumps and to select directional control valve components for use in pneumatic systems. Students diagram and build air relay logic circuits.

1 Credit hours

36 Lab hours

## 620-109 - Programmable Controllers 1

Learn to install programmable controllers, develop basic control programs and modify instructions to design programs. Troubleshoot machines controlled by programmable logic controllers. Wire input and output field devices. Document modifications to control panels. Monitor and troubleshoot machine processes. Develop HMI applications.

1 Credit hours

18 Lecture hours

## 620-110 - Integrated Manufacturing Planning - Electromechanical Technology

Students complete a project from concept to the point where a product is designed and its manufacturing process is planned. Emphasizes the project management process, teamwork, problem solving and decision making. It is suggested that the student take 620-111 Integrated Manufacturing, Production – Electromechanical Technology, in the semester after this course. (Prerequisites: 620-103 Semiconductor Devices; 620-104 Digital Electronics) Credit for Prior Learning Available

2 Credit hours

72 Lab hours

## 620-111 - Integrated Manufacturing Production - Electromechanical Technology

Students will simulate a manufacturing environment by building a workcell, developing a product through manufacture, and performing quality assurance checks. Emphasizes implementation of a project plan, teamwork, problem solving and decision making. (Prerequisite: 620-110 Integrated Manufacturing, Planning - Electromechanical Technology) Credit for Prior Learning Available

2 Credit hours

72 Lab hours

## 620-112 - PLC 1B

Explore more functions in programmable logic controller. Students will wire digital and analog industrial devices to the PLC system. Students will also learn to program and troubleshoot ladder logic programs using math functions, compare instructions, jump functions, MCR instructions, and subroutine applications.

1 Credit hours

18 Lecture hours

**620-115 - AC-DC Machinery and Motor Controls**

Explores the characteristics of AC and DC electric motors, generators, alternators and transformers. Analyzes the characteristics of different motor types. Implements electrical machine controls and conducts installation, testing and troubleshooting of machine control systems. (Prerequisite: 620-102 AC Circuits) Credit for Prior Learning Available

4 Credit hours

36 Lecture hours

72 Lab hours

**620-133 - Data Acquisition and Control**

Implements data acquisition using field devices and software. In this course, you will learn data acquisition, instrument control, data-logging, and measurement analysis applications as they apply to a testing environment. AutoCAD Electrical will also be introduced. Credit for Prior Learning Available

3 Credit hours

36 Lecture hours

36 Lab hours

**620-135 - Allen-Bradley PLCs and Ladder Logic**

Introduces industrial standard components found in simple control circuits and the programmable logic controller (PLC). Students will learn about industrial selector switches, momentary pushbuttons, relays, contactors, timers, and indicators. Electrical control panel drawings and symbols will also be introduced. Students will use their knowledge of these devices along with relay logic diagrams to wire various circuits. Students will learn to wire digital and analog industrial devices to the PLC system. Students will learn to program and troubleshoot ladder logic programs using gate functions, timers, counters, math functions, compare instructions, jump functions, MCR instructions and subroutine applications. Credit for Prior Learning Available

3 Credit hours

36 Lecture hours

36 Lab hours

**620-136 - Advanced Allen-Bradley PLCs and PanelVIEW**

Introduces programmable logic controller (PLC) project organization along with the relationship between tasks, programs, and routines. Students will learn to create and apply base tags, alias tags, arrays, and user defined tags along with additional PLC instructions. Introduces alternate PLC programming formats. Structured text, sequential function chart, and function block diagram programming will be applied to the PLC system. The integration and control of Ethernet VFDs along with Ethernet communications between PLCs and remote I/O systems will also be covered. Introduces operator interfaces and their application in the PLC system. (Prerequisite: 620-135 Allen-Bradley PLCs and Ladder Logic) Credit for Prior Learning Available

3 Credit hours

36 Lecture hours

36 Lab hours

**620-141 - Mechanical Drives 1**

Introduces the fundamentals of mechanical transmission systems used in industrial applications. Students will develop industry-relevant skills including how to operate, install, analyze, maintain, troubleshoot, and design basic mechanical transmission systems using chains, v-belts, spur gear, bearings, and couplings. Credit for Prior Learning Available

3 Credit hours

36 Lecture hours

36 Lab hours

**620-142 - Mechanical Drives 2**

Expands on Mechanical Drives 1 fundamentals. Students will examine bearings and right angle gears used in heavy duty mechanical transmission systems, along with industry laser shaft alignment. Students will set up, operate and apply laser shaft alignment to a variety of industrial applications. (Prerequisite: 620-141 Mechanical Drives 1) Credit for Prior Learning Available

3 Credit hours

36 Lecture hours

36 Lab hours

**620-146 - Instrumentation and Process Control**

Introduces students to the application of useful control and work functions. Basic process control theory, control loop characteristics, and sensor feedback devices are explored. Actual industrial controls, instrumentation and transducers are used in lab applications. Students apply integration techniques using digital, analog, electrical, mechanical, and hydraulic systems through laboratory experimentation. (Prerequisite: 620-133 Data Acquisition and Control) Credit for Prior Learning Available

3 Credit hours

36 Lecture hours

36 Lab hours

**620-150 - Data Communication and Protocols**

Focuses on industrial communications and fieldbus as they apply to the distributed control system. Students will explore technologies as they apply to automation and data exchange in manufacturing along with processes that include industrial internet and Industry 4.0. (Prerequisite: 620-104 Digital Electronics) Credit for Prior Learning Available

3 Credit hours

36 Lecture hours

36 Lab hours

**620-151 - Fanuc Robotics and Vision Systems**

Introduces industrial robotic systems. Studies applications, operation, programming, frames, coordinate systems, and troubleshooting of industrial robots. This course also prepares students to program and apply vision systems. The student will receive instruction on general vision concepts, including camera setup, lighting, and lensing, 2D Single and 2D Multiple View Process and perform hands-on programming. Credit for Prior Learning Available

3 Credit hours

36 Lecture hours

36 Lab hours