

ELECTROMECHANICAL TECHNOLOGY (620)

Information provided includes course descriptions by subject only. For complete 2018-2019 programs/academic plans, please refer to Academic Programs (<http://catalog.blackhawk.edu/academics>).

620-100 Hydraulics Credits: 3

This is a course in fundamental principles in the operation of fluid power, as it is used in the transmission of power through various components such as cylinders, motors, pumps, and valves.

Aid Code: 10 - Associate Degree.

Restrictions: Restricted to students admitted to Electro-Mechanical Technology Program.

Pre-requisites: 804-110

Co-requisites: (834-110 or 804-113)

Complete Course Listing

620-101 Fundamentals of DC circuits 1 Credits: 1

This course is a study of the basic theories, concepts, elements, and principles of DC circuits. The student investigates voltage, current, resistance and power, and will measure these values. Topics covered include Ohm's Law, meter use and basic series circuits.

Aid Code: 10 - Associate Degree.

Pre-requisites: (804-113 and 804-114))

Co-requisites: (620-116) and (804-115)

Complete Course Listing

620-102 Fundamentals of DC Circuits 2 Credits: 1

This course is a continuation of DC circuits 1. Students advance their knowledge and skill using series to parallel circuits and complex (series-parallel and parallel-series) circuits.

Aid Code: 10 - Associate Degree.

Co-requisites: (620-104)

Complete Course Listing

620-103 Fundamentals of DC Circuits 3 Credits: 1

This course is a continuation of DC circuits 2. The student will analyze voltage dividers and be introduced to capacitors and inductors, their DC charge and discharge time, and their applications. Students will work with magnetism and the operation of relays and solenoids.

Aid Code: 10 - Associate Degree.

Co-requisites: (620-147)

Complete Course Listing

620-104 Digital Logic Credits: 1

Students define basic logic gate functions and basic Boolean logic expressions. Students will analyze logic voltage timing diagrams, and determine logic outputs given logic inputs. Students perform lab activities in relation to logic operations using switches and gates.

Aid Code: 10 - Associate Degree.

Co-requisites: (620-101)

Complete Course Listing

620-105 Pneumatics Credits: 2

This course uses fundamental principles of compressed gasses that operate and power industrial equipment. Principles are applied in transmission of power through the various components such as cylinders, motors, compressors, distribution systems and valves. It also includes the analysis of pneumatic circuits.

Aid Code: 10 - Associate Degree.

Co-requisites: 620-100

Complete Course Listing

620-106 Electric Motors Credits: 1

The students perform, through lab activities, the basics of Motor & DC Permanent Magnet Theory and solid state DC Drives. The student will connect and operate DC Series, Shunt and Compound motors.

Aid Code: 10 - Associate Degree.

Complete Course Listing

620-107 Variable Speed Drives Credits: 1

This course presents learners with variable speed drives that provide power to and controls the operation of AC motors. Nametags, motor maintenance and shaft coupling alignment is also included. The course concludes by having the student describe, analyze and work with 1 and 3-phase power distribution systems.

Aid Code: 10 - Associate Degree.

Co-requisites: (620-114)

Complete Course Listing

620-108 Motors and Drives 3 Credits: 1

This course is a continuation of Motors & Drives 2. Students analyze poly-phase motors and troubleshooting control circuits. Students will engage in hands on activities which include Variable Frequency Drives and Shaft Coupling Alignment.

Aid Code: 10 - Associate Degree.

Pre-requisites: (620-123)

Complete Course Listing

620-109 Relay Logic Credits: 1

Students analyze relay theory and operation and apply this to hardwired AND & OR circuits, as well as start/stop circuits using relays. Relay ladder diagrams and motor starter circuits are defined.

Aid Code: 10 - Associate Degree.

Co-requisites: (620-117)

Complete Course Listing

620-110 Introduction to Programmable Logic Controllers (PLC)

Credits: 4

The student will study components that make up a programmable or microprocessor system and the various applications and operations used for digital and process controls in industry. The further use of programming is expanded to include ladder logic and diagrams. Diagnostic troubleshooting is applied along with analysis of interfacing microprocessors and programmable controllers to other control systems.

Aid Code: 10 - Associate Degree.

Co-requisites: 605-102

Complete Course Listing

620-111

Credits: 1

This course introduces students to the basics of programming fundamentals. Students analyze the fundamentals of computer operations, programming and logic principles, and empirical program design. Students will employ programming language to program microprocessors and other devices.

Aid Code: 10 - Associate Degree.

Pre-requisites: (620-118)

Complete Course Listing

620-112 Programming Fundamentals 2

Credits: 1

This is a continuation of Programming Fundamentals 1. Students advance their knowledge and skill with instructions and data manipulation. In a hands-on laboratory environment, language and instruction sets will be defined and used to control devices with a special emphasis on industrial applications.

Aid Code: 10 - Associate Degree.

Co-requisites: (801-195) and (620-106)

Complete Course Listing

620-113 Fundamentals of AC circuits 1

Credits: 1

Students explore the theory of alternating voltage and current, the sine wave and transformers. Students measure these values with meters and oscilloscopes in relation to reactance, impedance and phase differences.

Aid Code: 10 - Associate Degree.

Co-requisites: (620-121) and (804-115)

Complete Course Listing

620-114 Fundamentals of AC Circuits 2

Credits: 1

This course is a continuation of AC circuits 1. Students analyze capacitive and inductive reactance, impedance and phase properties of AC waveforms. Students will examine basic RL, RC and RLC circuits, as well as basic 3 phase voltage measurement.

Aid Code: 10 - Associate Degree.

Co-requisites: (620-112)

Complete Course Listing

620-115 Computer and Robotic Programming

Credits: 4

This course is primarily for students with little or no programming background. The course includes the fundamentals of computer operations. Students will be exposed to programming and logic principles that apply to industrial programming applications. The programming language will be employed to program microprocessors and robotic controls. The language and instruction sets will be studied and used to control devices with a special emphasis on industrial applications. The course includes hands-on laboratory sessions.

Aid Code: 10 - Associate Degree.

Pre-requisites: 620-110

Complete Course Listing

620-116 Fluid Power 1: Basic Pneumatics

Credits: 1

This course will introduce the student to pneumatics. Students will define the differences between hydraulics and pneumatics through observation of various circuit behavior. Hands-on learning will emphasize control theory of linear and rotary actuators and Vacuum technology will be examined.

Aid Code: 10 - Associate Degree.

Pre-requisites: 804-113 and 804-114)

Co-requisites: (620-146) and (804-115)

Complete Course Listing

620-117 Fluid Power 2: Basic Hydraulics

Credits: 1

This course is an introduction to Hydraulics. Students will examine the physical principles of confined fluids under pressure in both static and dynamic states. Hands-on learning will allow the student an opportunity to put together all of the components that comprise a hydraulic system.

Aid Code: 10 - Associate Degree.

Co-requisites: (620-102)

Complete Course Listing

620-118 Fluid Power Applications

Credits: 1

This course continues the study of pneumatics. Emphasis is placed on the electrical controls of pneumatic circuits while students analyze the operation of sequencing circuits and apply troubleshooting principles to identify faulted components.

Aid Code: 10 - Associate Degree.

Complete Course Listing

620-119 Fluid Power 4: Intermediate Hydraulics

Credits: 1

This course continues in the study of hydraulics. Students engage in hands-on activities which allow further practice with hydraulic flow, directional and pressure controls. Students spend time analyzing fluid conditioning, system maintenance and troubleshooting.

Aid Code: 10 - Associate Degree.

Co-requisites: (620-144)

Complete Course Listing

620-120 Motors and Drive Systems**Credits:** 2

This course covers principles for DC motors, AC motors, the drives and variable frequency drives (VFDs). Students will learn about motor types and drives in relationship with the appropriate application within industry. Also covered are electrical protective devices controls, single phase and three-phase power systems, and EMI. The student learns to design, install, and troubleshoot motor controls. Students learn more about electrical and electronic schematic diagrams to better understand the operation of drive control systems.

Aid Code: 10 - Associate Degree.**Pre-requisites:** (605-106)**Co-requisites:** (620-135)

Complete Course Listing

620-121 Programmable Automation Controllers (PACs) 1**Credits:** 1

This course is a continuation of the Programmable Logic Controllers course. Introduction to PACs is defined, including Creating Tags & Bit Level Instructions, PAC operation of Timers & Counters, Program Control, Project Organization & Documentation Arrays. Students engage in hands on activities to apply the aforementioned concepts.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-111)

Complete Course Listing

620-122 Programmable Automation Controllers (PACs) 2**Credits:** 1

This course is a continuation of PACs 1 with further exploration into Analog Inputs/Outputs, connecting Math theories, comparisons, move instructions and data manipulation. Students engage in hands-on lab activities with the aforementioned concepts as well as Interface Wiring.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-112)

Complete Course Listing

620-123 Programmable Automation Controllers (PACs) 3**Credits:** 1

This class is a continuation of PACs 2 and includes study of Sequencers and Shift Registers. Students engage in lab activities which include the analysis of Function Block Programming, Structured Text and Sequential Function Chart programming.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-131)

Complete Course Listing

620-124 Programmable Logic Controllers - PLCs**Credits:** 1

This course is an introduction to PLCs. Students will learn the parts and operation of a Programmable Logic Controller. They will apply basic ladder logic programming and transfer programs from the PC to the PLC. Students explore start stop circuits, timers and counters as they relate to the aforementioned concepts.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-134)

Complete Course Listing

620-125 Servos and Process Controls**Credits:** 2

Servomechanisms are used in various automated systems. Students will study principles and theories of servomechanisms and apply them in the laboratory. Process controls and instrumentation are applied to control loops systems in the laboratory. Electrical and electronic diagrams are studied to understand control loop systems. Some experiments are conducted on: hydraulic servo controls systems, DC motors, AC motors, stepper motors, and other controls systems.

Aid Code: 10 - Associate Degree.**Pre-requisites:** (605-106)**Co-requisites:** (620-135)

Complete Course Listing

620-126 Robotics 1**Credits:** 1

The students are introduced to the basics of robotics in this course. This includes defining specific terminology, types, configurations, specifications and application characteristics of robots. The student examines the basic parts of the robot and demonstrates their knowledge through the operation of these systems in laboratory exercises.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-107)

Complete Course Listing

620-127 Robotics 2**Credits:** 1

This course is a continuation of Robotics 1. Student engage in more advanced programming, using subroutines, Inputs and outputs, as well as data manipulation. Students are exposed to and use schematics as well as examine robotic troubleshooting.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-132)

Complete Course Listing

620-128 Servo systems Introduction**Credits:** 1

This course moves the student into further exploration of the automation process by introducing them to Servos and Feedback Devices. Hands-on lab activities engage the student in working with basic servo systems and Servo Fluid Power control.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-136)

Complete Course Listing

620-129 Servo Motion Programming**Credits:** 1

This course is a continuation of Servo Systems Introduction in which students learn programming motion control using servo systems. The student will create a motion profile, incorporating Registration and Camming techniques.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-141)

Complete Course Listing

620-130 Automated Cell Design and Planning

Credits: 2

The student learns the parameters and scope under which a project must function and be constructed. Based on these parameters, the student will design, plan and learn the steps of execution in building an automated robotic cell. Students will learn planning and the use of control tools such as: work breakdown schedule (WBS) and Gantt charts. These tools assist the student in the design, plan, and execution of their work cell. These tools also assist the student in keeping their project on schedule and on budget.

Aid Code: 10 - Associate Degree.

Restrictions: Restricted to students admitted to Electro-Mechanical Technology Program.

Pre-requisites: (620-115) and (605-106)

Co-requisites: (620-125)

Complete Course Listing

620-131 Solid State Devices 1

Credits: 1

This course introduces the student to semiconductor materials, the operation of diodes, Zener diodes and the construction of rectifier and filter circuits. Students perform laboratory experiments that include fundamental transistor construction and switching operation in order to verify the theory.

Aid Code: 10 - Associate Degree.

Co-requisites: (620-126)

Complete Course Listing

620-132 Solid State Devices 2

Credits: 1

This course is a continuation of Solid State Devices 1. Students examine BJT amplifier circuits. JFETs and MOSFETs as well as their uses application in industry. Specifications and schematics of all devices are analyzed.

Aid Code: 10 - Associate Degree.

Co-requisites: (620-108)

Complete Course Listing

620-133 Solid State Devices 3

Credits: 1

This course is a continuation of Solid State Devices 1. SCRs and Triacs operation and applications are introduced to the student as well as an analysis of control circuitry and phase angle firing properties.

Aid Code: 10 - Associate Degree.

Co-requisites: (620-128)

Complete Course Listing

620-134 Sensors

Credits: 1

Covers various types of sensors used in industrial operations such as inductive and capacitive proximity detectors, Hall-effect devices and various optical sensing modes. Applications are explored, and connection modes are verified with hands- on activities.

Aid Code: 10 - Associate Degree.

Complete Course Listing

620-135 Power Devices

Credits: 3

This course is an essential study of the various types of power handling solid-state devices found in automation and other electronic equipment. The devices include SCR's, DIAC's and TRIAC's. Regulated and unregulated design power supplies are covered, which include analog and switching types. This course will introduce the student to the design of circuits using power handling devices and the ratings for these types of components. Students will learn to read and interpret schematics used in the electronics industry. This course teaches the study of electronic machine elements, which includes electrical, and electronics drawings and the associated symbols.

Aid Code: 10 - Associate Degree.

Pre-requisites: 605-106

Complete Course Listing

620-136 Automation 1

Credits: 1

This course expands the student's knowledge from program courses by exploring Thermocouple and RTD I/O functions in a processor format. Students engage in formatting and using trend charts and high speed counters.

Aid Code: 10 - Associate Degree.

Co-requisites: (620-148)

Complete Course Listing

620-137 Automation 2

Credits: 1

This course is a continuation of Automation 1, expanding the student's knowledge base by introducing DNET (device net) ENET (EtherNET) communication and Configuring Devices in RSNetwork. Through the use of RSNetwork, students perform these concepts through barcode scanning and RFID functioning.

Aid Code: 10 - Associate Degree.

Pre-requisites: (620-139)

Complete Course Listing

620-138 Automation 3

Credits: 1

This course is a continuation of Automation 2 and further explores processing functions of locating and editing I/O Tags and Devices, and forcing bits. Students engage in hands on activities which include troubleshooting PAC Systems through analyzing digital, analog and distributed I/O.

Aid Code: 10 - Associate Degree.

Co-requisites: (620-142)

Complete Course Listing

620-139 Machine Vision Systems

Credits: 1

This course gives students an introduction to vision systems. Students perform activities which include camera setup, lighting parameters, lenses and study their applications. Students program vision systems and integrate them into PAC systems.

Aid Code: 10 - Associate Degree.

Co-requisites: (620-133)

Complete Course Listing

620-140 Robotic Systems**Credits:** 3

The basics of robotics are introduced. This includes terminology, types, configurations, specifications and application characteristics of robots. Mechanical drive systems, along with control systems for automation, are studied. The student learns the basic parts of the robot and will operate these systems in laboratory exercises.

Aid Code: 10 - Associate Degree.**Restrictions:** Restricted to students admitted to Electro-Mechanical Technology Program.**Pre-requisites:** (605-104) and (620-105) and (620-115)
Complete Course Listing**620-141 Process Control 1****Credits:** 1

This course begins the culmination of program concepts introducing the student to process methods and techniques as well as controller operation. Students apply concepts through Open Loop Discrete Control, PID function and Temperature Control activities performed in the lab.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-137)

Complete Course Listing

620-142 Process Control 2**Credits:** 1

This course is a continuation of Process Control 1, and analyzes more concepts through lab experiments in Process Level Control, Flow Control, and Pressure Control.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-129)

Complete Course Listing

620-143 Process Control 3**Credits:** 1

This class is a continuation of Process Control 2. The student explores more in-depth concepts in the process field by analyzing Weight Control and Loop Calibrations. Hands-on lab activities engage the student in Function Block programming of PID instructions.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-138)

Complete Course Listing

620-144 Human Machine Interfaces (HMI)**Credits:** 1

This course analyzes the configuring and programming of Human Machine Interface (HMI) devices such as panel view touch screens. Students will work with the Allen Bradley FactoryTalk View Application to display and manipulate graphic objects as well as create and configure trends and run-time files in a lab environment.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-127)

Complete Course Listing

620-145 Program Controllers and Human Interfacing Modules (HIM) Devices**Credits:** 4

The student will study system components and devices that make up a programmable or microprocessor system. Various applications and operations used for digital and process controls in industry will be studied. Further use of programming is expanded to include ladder logic, function flow control, and block instructions. Networking and interfacing to other computer systems and remote inputs and outputs modules are studied and applied. Human Interfacing Modules (HIM's) are studied and programmed. HIM's are setup to connect with the network or PLC's. Diagnostic troubleshooting of PLC's and HIM's is applied to real world control systems.

Aid Code: 10 - Associate Degree.**Pre-requisites:** (620-110) and (620-115)

Complete Course Listing

620-146 Mechanics 1**Credits:** 1

This course will examine the proper use of basic hand and power tools. Drilling, tapping, saw use, and semi-precision measurement are demonstrated and performed by the student. Fastener types and specifications are explored. Students analyze and operate simple machines such as levers and pulleys, as well as gears and linkages.

Aid Code: 10 - Associate Degree.

Complete Course Listing

620-147 Mechanics 2**Credits:** 1

This course is a continuation of Mechanics 1. Students engage in further shop practices, such as precision measurement, precision drilling, and basic manual milling operations. Students will examine basic print reading and design.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-109)

Complete Course Listing

620-148 Industrial Integration**Credits:** 1

Students analyze the interconnection and communication of industrial devices in this course. Discrete and network I/O communication is examined using Robots and PLCs. Students create a basic system comprised of various industrial devices.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-152) and (631-108) and (801-197)

Complete Course Listing

620-149 Project Planning**Credits:** 1

The student examines the parameters and scope under which a project must function and be constructed. Students will engage in planning and the use of control tools such as: a Statement of Work (SOW), a Work Breakdown Schedule (WBS) and Gantt charts. These tools assist the student as they design, plan, and perform the execution of a work cell.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-137) and (809-196)

Complete Course Listing

620-150 Interfacing Robotic Devices**Credits:** 4

This course focuses on the integration of a complete automated robotic cell. Many component parts are interconnected in order for the cell to operate properly. Student will interface: PLC's, robots, personal computers, vision systems, sensors, motor drives, conveyors, fluid power devices, and other programmable or hard automation. Topologies for networking, architectures and protocols are covered and employed in industrial control systems. In addition, wireless network technologies, and related hardware will be explored. Student will construct, wire, program, network, troubleshoot and document the complete automated robotic cell.

Aid Code: 10 - Associate Degree.**Restrictions:** Restricted to students admitted to Electro-Mechanical Technology Program.**Pre-requisites:** (620-125) and (620-130) and (620-140)**Co-requisites:** (620-155)

Complete Course Listing

620-151 Automation Capstone**Credits:** 4

This course focuses on the integration of a complete automated robotic cell with the many component parts interconnected in order for the cell to operate properly. Student will interface PLC's, robots, personal computers, vision systems, sensors, motor drives, conveyors, fluid power devices, and other programmable or hard automation.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-149) and (809-198)

Complete Course Listing

620-152 Circuit Connection Techniques**Credits:** 1

The basic construction of circuit boards is examined, as well as the acceptability of soldered components. Through hole and surface mount soldering activities, students fuse parts together with tin lead solder and lead free solder techniques.

Aid Code: 10 - Associate Degree.**Co-requisites:** (620-119)

Complete Course Listing

620-155 Automated Robotic Cells**Credits:** 4

The student will apply the concepts of robots and automation by building a small automation system. This automation cell will be accomplished within the framework of an assigned team of students. Student will apply learned concepts studied in previous classes. These concepts will assist in building, testing, and running their automated work cell. Student will develop, and apply project planning, time management and cooperative methods with their team members to build their work cell. Student will learn how to design and make parts for this project. They also will specify and purchase parts as well as, analyze system malfunctions, which may occur to the modular level. Student will practice the skills needed to interface and make repairs. By using such organizational tools as WBS and Gantt charts, the student team will learn how to finish the project on time and on budget.

Aid Code: 10 - Associate Degree.**Restrictions:** Restricted to students admitted to Electro-Mechanical Technology Program.**Pre-requisites:** (620-120) and (620-130) and (620-140)**Co-requisites:** (620-150)

Complete Course Listing

620-164 Safety 1**Credits:** 1

This course focuses on workplace safety, health and inspections. OSHA standards are introduced, how to prepare for and conduct inspections, how to become acutely aware of various hazards and ways in which to effectively communicate to others that they exist. Students will demonstrate the proper use of personal protective equipment (PPE), and fire and safety emergency responsiveness.

Aid Code: 10 - Associate Degree.

Complete Course Listing

620-165 Safety 2**Credits:** 1

This course is a continuation of Safety 1. Specific topics that are introduced and demonstrated include electrical safety around how to safely use various power tools and hand tools, logout/tagout procedures, ergonomics, and how to properly work with bloodborne pathogens.

Aid Code: 10 - Associate Degree.**Pre-requisites:** (620-164)

Complete Course Listing

620-166 Conveyor Systems 1**Credits:** 1

In this course, students examine multiple facets of different conveyor systems, components and operation. Students analyze the different aspects of a conveyor system and demonstrate proper fittings for components and operational procedures.

Aid Code: 10 - Associate Degree.

Complete Course Listing

620-167 Conveyor Systems 2**Credits:** 1

In this course, students examine multiple facets of different conveyor systems, including the screw, flat belt, and roller conveyors. While incorporating conveyors safety procedures, students will analyze the different systems used to make up an effective belt conveyor and be able to apply standard applications, preventive maintenance, and repair principles when working with various types of conveyors.

Aid Code: 10 - Associate Degree.

Complete Course Listing

620-168 Lathes**Credits:** 1

This course examines the basics of lathe fabrication processes that are common to the Electro Mechanical and Industrial Maintenance field. Students will demonstrate the basics of metal turning techniques.

Aid Code: 10 - Associate Degree.

Complete Course Listing

620-169 Mills**Credits:** 1

This course is designed to outline for students the basics of milling fabrication processes that are common to the Electro-Mechanical and Industrial Maintenance field. Through demonstration and practice, students will be able to identify machine parts, analyze their function, and perform simple milling operations. Students will be able to demonstrate the basic use of mills, related safety, maintenance, metal cutting theory, cutting tools, and work holding for the mill.

Aid Code: 10 - Associate Degree.

Complete Course Listing

620-170 Valves, Gaskets and Seals**Credits:** 1

Students will examine and demonstrate standard procedures related to installing, maintaining, and replacing valves, gaskets, and seals in industrial applications.

Aid Code: 10 - Associate Degree.

Complete Course Listing

620-171 Human Relations in the Industrial Setting**Credits:** 2

This course is designed to give students insight into how an individual's behaviors and abilities affect their relationships with others at work and with customers. Areas stressed include presenting a professional image in seeking employment, developing a positive work attitude, reliability on the job and an awareness of personal adjustments required for gainful employment.

Aid Code: 10 - Associate Degree.

Complete Course Listing

620-172 Machine Setup & Installation**Credits:** 1

This course examines standard applications of rigging, machine leveling which are common in industry. Students will perform several leveling and alignment procedures and the common components used to lift and move machinery and equipment while incorporating standard safety procedures.

Aid Code: 10 - Associate Degree.

Complete Course Listing

620-173 Blueprint Reading for Machine Prints**Credits:** 1

This course is designed to demonstrate the basics of machine print reading. Students will be able to analyze and recognize unique features of machining assembly prints. The student will interpret orthographic projection drawings including sectional, auxiliary views, threads, surface finishes, geometric dimensions, and tolerances.

Aid Code: 10 - Associate Degree.

Complete Course Listing

620-174 Mechanical Power Transmission**Credits:** 1

This course engages students in the application of gears, belts, bearings, chain drives, and lubrication processes used in industry. Students will interpret and apply the basic industry standard principles of operation, installation, preventative maintenance, and repair procedures.

Aid Code: 10 - Associate Degree.

Complete Course Listing

620-175**Credits:** 1

This course introduces servomechanism systems used to operate many types of automated systems. Students analyze concepts and elements of open and closed-loop systems, including the fundamental coverage of PID control modes. Feedback sensing devices such as encoders, tachometers, resolvers and LVDTs are examined and the operation of position and velocity control systems is demonstrated. Through the application of basic programming, students are examine the terminology, movements and the physical construction of a robot and the applications for which they are used.

Aid Code: 10 - Associate Degree.

Complete Course Listing

620-702 Mechatronic Principles**Credits:** 2

This program configuration represents a statewide model for class cohorts in the related instruction portion of the mechatronics technician apprenticeship. The model outlines related instruction for 3 years and 6 semesters (terms). It reflects a total of 864 hours of combined on-campus lecture, demonstration, shop, and hands-on learning aligned with DWD-BAS apprenticeship training standards. This model is designed for class meetings one day per week, and every week during 2 semesters per year. This model provides foundational skills apprentices will need in on-the-job learning during the final 2 years of their apprenticeship. The model provides 288 hours of learning in each of the following disciplines: mechanical, electrical, and automation. This model aligns WTCS learning outcomes with relevant industry/manufacturing standards as identified by an industry validated DACUM and Exhibit A work processes approved by the state trade committee. Supporting documentation may be found in the BAS Mechatronics Technician Job Book pending in 2016-7. The model also aligns common and consistent course numbers that colleges may use across the WTCS (along with recommended hours, credits and pre-requisites). This curriculum model may be interpreted and implemented by the colleges as required to meet local needs and in support of local work processes approved by the trade and DWD-BAS.

Aid Code: 50 - Apprentice.

Complete Course Listing

620-703 DC Electricity for Mechatronics**Credits:** 1

This program configuration represents a statewide model for class cohorts in the related instruction portion of the mechatronics technician apprenticeship. The model outlines related instruction for 3 years and 6 semesters (terms). It reflects a total of 864 hours of combined on-campus lecture, demonstration, shop, and hands-on learning aligned with DWD-BAS apprenticeship training standards. This model is designed for class meetings one day per week, and every week during 2 semesters per year. This model provides foundational skills apprentices will need in on-the-job learning during the final 2 years of their apprenticeship. The model provides 288 hours of learning in each of the following disciplines: mechanical, electrical, and automation. This model aligns WTCS learning outcomes with relevant industry/manufacturing standards as identified by an industry validated DACUM and Exhibit A work processes approved by the state trade committee. Supporting documentation may be found in the BAS Mechatronics Technician Job Book pending in 2016-7. The model also aligns common and consistent course numbers that colleges may use across the WTCS (along with recommended hours, credits and pre-requisites). This curriculum model may be interpreted and implemented by the colleges as required to meet local needs and in support of local work processes approved by the trade and DWD-BAS.

Aid Code: 50 - Apprentice.

Complete Course Listing

620-704 AC Electricity for Mechatronics**Credits:** 1

This program configuration represents a statewide model for class cohorts in the related instruction portion of the mechatronics technician apprenticeship. The model outlines related instruction for 3 years and 6 semesters (terms). It reflects a total of 864 hours of combined on-campus lecture, demonstration, shop, and hands-on learning aligned with DWD-BAS apprenticeship training standards. This model is designed for class meetings one day per week, and every week during 2 semesters per year. This model provides foundational skills apprentices will need in on-the-job learning during the final 2 years of their apprenticeship. The model provides 288 hours of learning in each of the following disciplines: mechanical, electrical, and automation. This model aligns WTCS learning outcomes with relevant industry/manufacturing standards as identified by an industry validated DACUM and Exhibit A work processes approved by the state trade committee. Supporting documentation may be found in the BAS Mechatronics Technician Job Book pending in 2016-7. The model also aligns common and consistent course numbers that colleges may use across the WTCS (along with recommended hours, credits and pre-requisites). This curriculum model may be interpreted and implemented by the colleges as required to meet local needs and in support of local work processes approved by the trade and DWD-BAS.

Aid Code: 50 - Apprentice.

Complete Course Listing

620-705 Motors & Motor Control for Mechatronics**Credits:** 2

This program configuration represents a statewide model for class cohorts in the related instruction portion of the mechatronics technician apprenticeship. The model outlines related instruction for 3 years and 6 semesters (terms). It reflects a total of 864 hours of combined on-campus lecture, demonstration, shop, and hands-on learning aligned with DWD-BAS apprenticeship training standards. This model is designed for class meetings one day per week, and every week during 2 semesters per year. This model provides foundational skills apprentices will need in on-the-job learning during the final 2 years of their apprenticeship. The model provides 288 hours of learning in each of the following disciplines: mechanical, electrical, and automation. This model aligns WTCS learning outcomes with relevant industry/manufacturing standards as identified by an industry validated DACUM and Exhibit A work processes approved by the state trade committee. Supporting documentation may be found in the BAS Mechatronics Technician Job Book pending in 2016-7. The model also aligns common and consistent course numbers that colleges may use across the WTCS (along with recommended hours, credits and pre-requisites). This curriculum model may be interpreted and implemented by the colleges as required to meet local needs and in support of local work processes approved by the trade and DWD-BAS.

Aid Code: 50 - Apprentice.

Complete Course Listing

620-706 Electrical Codes for Mechatronics**Credits:** 1

This program configuration represents a statewide model for class cohorts in the related instruction portion of the mechatronics technician apprenticeship. The model outlines related instruction for 3 years and 6 semesters (terms). It reflects a total of 864 hours of combined on-campus lecture, demonstration, shop, and hands-on learning aligned with DWD-BAS apprenticeship training standards. This model is designed for class meetings one day per week, and every week during 2 semesters per year. This model provides foundational skills apprentices will need in on-the-job learning during the final 2 years of their apprenticeship. The model provides 288 hours of learning in each of the following disciplines: mechanical, electrical, and automation. This model aligns WTCS learning outcomes with relevant industry/manufacturing standards as identified by an industry validated DACUM and Exhibit A work processes approved by the state trade committee. Supporting documentation may be found in the BAS Mechatronics Technician Job Book pending in 2016-7. The model also aligns common and consistent course numbers that colleges may use across the WTCS (along with recommended hours, credits and pre-requisites). This curriculum model may be interpreted and implemented by the colleges as required to meet local needs and in support of local work processes approved by the trade and DWD-BAS.

Aid Code: 50 - Apprentice.

Complete Course Listing

620-707 Welding Basics for Mechatronics**Credits:** 1

This program configuration represents a statewide model for class cohorts in the related instruction portion of the mechatronics technician apprenticeship. The model outlines related instruction for 3 years and 6 semesters (terms). It reflects a total of 864 hours of combined on-campus lecture, demonstration, shop, and hands-on learning aligned with DWD-BAS apprenticeship training standards. This model is designed for class meetings one day per week, and every week during 2 semesters per year. This model provides foundational skills apprentices will need in on-the-job learning during the final 2 years of their apprenticeship. The model provides 288 hours of learning in each of the following disciplines: mechanical, electrical, and automation. This model aligns WTCS learning outcomes with relevant industry/manufacturing standards as identified by an industry validated DACUM and Exhibit A work processes approved by the state trade committee. Supporting documentation may be found in the BAS Mechatronics Technician Job Book pending in 2016-7. The model also aligns common and consistent course numbers that colleges may use across the WTCS (along with recommended hours, credits and pre-requisites). This curriculum model may be interpreted and implemented by the colleges as required to meet local needs and in support of local work processes approved by the trade and DWD-BAS.

Aid Code: 50 - Apprentice.

Complete Course Listing

620-708 Fluid Power Systems for Mechatronic Apprentices**Credits:** 2

This program configuration represents a statewide model for class cohorts in the related instruction portion of the mechatronics technician apprenticeship. The model outlines related instruction for 3 years and 6 semesters (terms). It reflects a total of 864 hours of combined on-campus lecture, demonstration, shop, and hands-on learning aligned with DWD-BAS apprenticeship training standards. This model is designed for class meetings one day per week, and every week during 2 semesters per year. This model provides foundational skills apprentices will need in on-the-job learning during the final 2 years of their apprenticeship. The model provides 288 hours of learning in each of the following disciplines: mechanical, electrical, and automation. This model aligns WTCS learning outcomes with relevant industry/manufacturing standards as identified by an industry validated DACUM and Exhibit A work processes approved by the state trade committee. Supporting documentation may be found in the BAS Mechatronics Technician Job Book pending in 2016-7. The model also aligns common and consistent course numbers that colleges may use across the WTCS (along with recommended hours, credits and pre-requisites). This curriculum model may be interpreted and implemented by the colleges as required to meet local needs and in support of local work processes approved by the trade and DWD-BAS.

Aid Code: 50 - Apprentice.

Complete Course Listing

620-709 Servos and Drives for Mechatronics**Credits:** 1

This program configuration represents a statewide model for class cohorts in the related instruction portion of the mechatronics technician apprenticeship. The model outlines related instruction for 3 years and 6 semesters (terms). It reflects a total of 864 hours of combined on-campus lecture, demonstration, shop, and hands-on learning aligned with DWD-BAS apprenticeship training standards. This model is designed for class meetings one day per week, and every week during 2 semesters per year. This model provides foundational skills apprentices will need in on-the-job learning during the final 2 years of their apprenticeship. The model provides 288 hours of learning in each of the following disciplines: mechanical, electrical, and automation. This model aligns WTCS learning outcomes with relevant industry/manufacturing standards as identified by an industry validated DACUM and Exhibit A work processes approved by the state trade committee. Supporting documentation may be found in the BAS Mechatronics Technician Job Book pending in 2016-7. The model also aligns common and consistent course numbers that colleges may use across the WTCS (along with recommended hours, credits and pre-requisites). This curriculum model may be interpreted and implemented by the colleges as required to meet local needs and in support of local work processes approved by the trade and DWD-BAS.

Aid Code: 50 - Apprentice.

Complete Course Listing

620-710 Power Transmission Systems for Mechatronics**Credits:** 1

This program configuration represents a statewide model for class cohorts in the related instruction portion of the mechatronics technician apprenticeship. The model outlines related instruction for 3 years and 6 semesters (terms). It reflects a total of 864 hours of combined on-campus lecture, demonstration, shop, and hands-on learning aligned with DWD-BAS apprenticeship training standards. This model is designed for class meetings one day per week, and every week during 2 semesters per year. This model provides foundational skills apprentices will need in on-the-job learning during the final 2 years of their apprenticeship. The model provides 288 hours of learning in each of the following disciplines: mechanical, electrical, and automation. This model aligns WTCS learning outcomes with relevant industry/manufacturing standards as identified by an industry validated DACUM and Exhibit A work processes approved by the state trade committee. Supporting documentation may be found in the BAS Mechatronics Technician Job Book pending in 2016-7. The model also aligns common and consistent course numbers that colleges may use across the WTCS (along with recommended hours, credits and pre-requisites). This curriculum model may be interpreted and implemented by the colleges as required to meet local needs and in support of local work processes approved by the trade and DWD-BAS.

Aid Code: 50 - Apprentice.

Complete Course Listing

620-711 Machining Concepts for Mechatronics**Credits:** 2

This program configuration represents a statewide model for class cohorts in the related instruction portion of the mechatronics technician apprenticeship. The model outlines related instruction for 3 years and 6 semesters (terms). It reflects a total of 864 hours of combined on-campus lecture, demonstration, shop, and hands-on learning aligned with DWD-BAS apprenticeship training standards. This model is designed for class meetings one day per week, and every week during 2 semesters per year. This model provides foundational skills apprentices will need in on-the-job learning during the final 2 years of their apprenticeship. The model provides 288 hours of learning in each of the following disciplines: mechanical, electrical, and automation. This model aligns WTCS learning outcomes with relevant industry/manufacturing standards as identified by an industry validated DACUM and Exhibit A work processes approved by the state trade committee. Supporting documentation may be found in the BAS Mechatronics Technician Job Book pending in 2016-7. The model also aligns common and consistent course numbers that colleges may use across the WTCS (along with recommended hours, credits and pre-requisites). This curriculum model may be interpreted and implemented by the colleges as required to meet local needs and in support of local work processes approved by the trade and DWD-BAS.

Aid Code: 50 - Apprentice.

Complete Course Listing

620-712 Introduction to Programmable Logic Controllers**Credits:** 2

This program configuration represents a statewide model for class cohorts in the related instruction portion of the mechatronics technician apprenticeship. The model outlines related instruction for 3 years and 6 semesters (terms). It reflects a total of 864 hours of combined on-campus lecture, demonstration, shop, and hands-on learning aligned with DWD-BAS apprenticeship training standards. This model is designed for class meetings one day per week, and every week during 2 semesters per year. This model provides foundational skills apprentices will need in on-the-job learning during the final 2 years of their apprenticeship. The model provides 288 hours of learning in each of the following disciplines: mechanical, electrical, and automation. This model aligns WTCS learning outcomes with relevant industry/manufacturing standards as identified by an industry validated DACUM and Exhibit A work processes approved by the state trade committee. Supporting documentation may be found in the BAS Mechatronics Technician Job Book pending in 2016-7. The model also aligns common and consistent course numbers that colleges may use across the WTCS (along with recommended hours, credits and pre-requisites). This curriculum model may be interpreted and implemented by the colleges as required to meet local needs and in support of local work processes approved by the trade and DWD-BAS.

Aid Code: 50 - Apprentice.

Complete Course Listing

620-714 HMI Technologies & PLC Applications for Mechatronics**Credits:** 2

This program configuration represents a statewide model for class cohorts in the related instruction portion of the mechatronics technician apprenticeship. The model outlines related instruction for 3 years and 6 semesters (terms). It reflects a total of 864 hours of combined on-campus lecture, demonstration, shop, and hands-on learning aligned with DWD-BAS apprenticeship training standards. This model is designed for class meetings one day per week, and every week during 2 semesters per year. This model provides foundational skills apprentices will need in on-the-job learning during the final 2 years of their apprenticeship. The model provides 288 hours of learning in each of the following disciplines: mechanical, electrical, and automation. This model aligns WTCS learning outcomes with relevant industry/manufacturing standards as identified by an industry validated DACUM and Exhibit A work processes approved by the state trade committee. Supporting documentation may be found in the BAS Mechatronics Technician Job Book pending in 2016-7. The model also aligns common and consistent course numbers that colleges may use across the WTCS (along with recommended hours, credits and pre-requisites). This curriculum model may be interpreted and implemented by the colleges as required to meet local needs and in support of local work processes approved by the trade and DWD-BAS.

Aid Code: 50 - Apprentice.

Complete Course Listing

620-715 Introduction to Robotic Systems for Mechatronics**Credits:** 2

This program configuration represents a statewide model for class cohorts in the related instruction portion of the mechatronics technician apprenticeship. The model outlines related instruction for 3 years and 6 semesters (terms). It reflects a total of 864 hours of combined on-campus lecture, demonstration, shop, and hands-on learning aligned with DWD-BAS apprenticeship training standards. This model is designed for class meetings one day per week, and every week during 2 semesters per year. This model provides foundational skills apprentices will need in on-the-job learning during the final 2 years of their apprenticeship. The model provides 288 hours of learning in each of the following disciplines: mechanical, electrical, and automation. This model aligns WTCS learning outcomes with relevant industry/manufacturing standards as identified by an industry validated DACUM and Exhibit A work processes approved by the state trade committee. Supporting documentation may be found in the BAS Mechatronics Technician Job Book pending in 2016-7. The model also aligns common and consistent course numbers that colleges may use across the WTCS (along with recommended hours, credits and pre-requisites). This curriculum model may be interpreted and implemented by the colleges as required to meet local needs and in support of local work processes approved by the trade and DWD-BAS.

Aid Code: 50 - Apprentice.[Complete Course Listing](#)**620-716 Introduction to Robotic Integration****Credits:** 3

This program configuration represents a statewide model for class cohorts in the related instruction portion of the mechatronics technician apprenticeship. The model outlines related instruction for 3 years and 6 semesters (terms). It reflects a total of 864 hours of combined on-campus lecture, demonstration, shop, and hands-on learning aligned with DWD-BAS apprenticeship training standards. This model is designed for class meetings one day per week, and every week during 2 semesters per year. This model provides foundational skills apprentices will need in on-the-job learning during the final 2 years of their apprenticeship. The model provides 288 hours of learning in each of the following disciplines: mechanical, electrical, and automation. This model aligns WTCS learning outcomes with relevant industry/manufacturing standards as identified by an industry validated DACUM and Exhibit A work processes approved by the state trade committee. Supporting documentation may be found in the BAS Mechatronics Technician Job Book pending in 2016-7. The model also aligns common and consistent course numbers that colleges may use across the WTCS (along with recommended hours, credits and pre-requisites). This curriculum model may be interpreted and implemented by the colleges as required to meet local needs and in support of local work processes approved by the trade and DWD-BAS.

Aid Code: 50 - Apprentice.[Complete Course Listing](#)**620-900 Safety 1****Credits:** 1

This course focuses on workplace safety, health and inspections. OSHA standards are introduced, how to prepare for and conduct inspections, how to become acutely aware of various hazards and ways in which to effectively communicate to others that they exist. Students will demonstrate the proper use of personal protective equipment (PPE), and fire and safety emergency responsiveness.

Aid Code: 10 - Associate Degree.[Complete Course Listing](#)