Virginia CTE

Mechatronics 3 (8556)

Applying 4.0 Basic Safety Standards for Mechatronics M3.1	1 **Comply with federal, state, and local safety requirements.** M3.1.1
	2 **Demonstrate lockout-tagout procedures.** M3.1.2
	3 **Maintain a safe working environment.** M3.1.3
	4 **Explain safe working practices around electrical hazards.** M3.1.4
	5 **Identify emergency first-aid procedures.** M3.1.5
	6 **Identify the types of fires and the methods used to extinguish them.** M3.1.6
	7 **(Optional) Demonstrate the use of a fire extinguisher.** M3.1.7
	8 **Identify personal protective equipment (PPE) requirements.** M3.1.8
	9 **Inspect hand and power tools to ensure safety and usability.** M3.1.9
	10 **Demonstrate lifting and carrying techniques.** M3.1.10
	11 **Report injuries.** M3.1.11
	12 **Report personal, environmental, and equipment safety violations to the appropriate authority.** M3.1.12
	13 **Pass the safety exam.** M3.1.13
Exploring Programming Applications M3.2	1 **Create sequential programs using flowcharts.** M3.2.1
	2 **Describe the use of logic in programming machines used in industry.** M3.2.2
	3 **Convert units in numeric systems.** M3.2.3
Understanding Programmable Logic Controller Systems M3.3	1 **Explain the role of programmable logic controllers (PLCs) (or programmable automation controllers [PACs]) within mechatronic systems, modules, and subsystems.** M3.3.1
	2 **Trace the flow of information in a control function for a mechatronic system or subsystem.** M3.3.2
	3 **Define the term Industry 4.0 Industrial Internet of Things (IIoT).** M3.3.3

	4 Describe the basic functions and design of PLCs. M3.3.4
	5 Describe numbering systems and data types used in computer programming. M3.3.5
	6 Describe DeMorgan's theorem. M3.3.6
	7 Apply DeMorgan's theorem in creating logic circuits. M3.3.7
	8 Simplify logical equations. M3.3.8
	9 Create Boolean logic equations to prescribe the use of logic gates in the implementation of a given scenario. M3.3.9
	10 Explain hexadecimal, decimal, octal, binary, 2s complement, and binary coded decimal (BCD) values as used in a common PLC. M3.3.10
	11 Explain ladder logic and function block diagram (FBD) programming. M3.3.11
	12 Convert wiring and line or ladder diagrams for simple logic tasks into PLC programs. M3.3.12
	13 Connect a PLC with electrical components. M3.3.13
	14 Create PLC programs. M3.3.14
	15 Execute PLC programs on a PLC. M3.3.15
Troubleshooting Fluid-Power Systems M3.4	1 Assess pneumatic and/or hydraulic components within a mechatronic system. M3.4.1
	2 Perform adjustments on pneumatic and/or hydraulic components within a mechatronic system. M3.4.2
	3 Document adjustments in an equipment log. M3.4.3
	4 Troubleshoot malfunctioning pneumatic and/or hydraulic systems. M3.4.4
	5 Document the cause and repair of the malfunction. M3.4.5
Preparing for Industry Certification M3.5	1 Describe the process and requirements for obtaining industry certifications related to the mechatronics course. M3.5.1
	2 Identify testing skills and strategies for certification examination. M3.5.2
	3 Demonstrate ability to successfully complete selected practice examinations (e.g., practice questions similar to those on certification examinations). M3.5.3

4 **Complete an industry certification examination representative of skills learned in this course.** M3.5.4