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
	Define the term Industry 4.0 Industrial Internet of Things (IIoT). M3.3.3

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	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

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