SkillsUSA | Career Essentials: *Assessments*

Mechatronics Blueprint

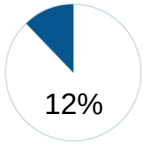
This Blueprint contains the subject matter content for the Career Essentials - Assessment.

Note: To fully prepare for the Mechatronics SkillsUSA Championships contest, refer to the current year's SkillsUSA Championships Technical Standard, now included with your SkillsUSA Professional Membership. If you need help in accessing this benefit, contact the SkillsUSA Customer Care Team at 844-875-4557 or customercare@skillsusa.org.

Standards and Competencies

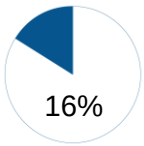
Competencies are weighted throughout the assessment. The percent shown is the weight of the competency. There are 50 questions per assessment.

Read and interpret blueprints



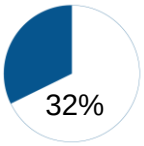
- Read and interpret electrical schematics
- Read and interpret mechanical drawings
- Read and interpret fluid power circuit diagrams

Build a Mechatronic device based upon given specifications



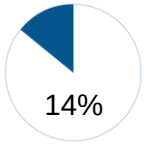
- Utilize measurement tools
- Select fasteners to mount components
- Utilize appropriate wires to make correct electrical connections
- Utilize appropriate tubing to make pneumatic connections
- Employ best practices in laying out wires and tubes for neatness, security and safe operation
- Adjust subsystems by utilizing interdisciplinary skills
- Adjust and calibrate subsystems by utilizing interdisciplinary skills
- Employ proper safety equipment and practices

Identify and troubleshoot mechanical, fluid power, electrical and electronic components



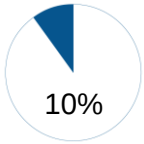
- Use resistance, voltage, and current test electrical equipment properly
- Install, identify, adjust and troubleshoot logic components and systems
- Install, identify, adjust and troubleshoot actuators
- Install, identify, adjust and troubleshoot sensors
- Install, identify, adjust and troubleshoot electrical components
- Select and install threaded fasteners
- Perform precision measuring on mechanical components
- Identify, install, service, adjust and troubleshoot pneumatic systems
- Identify, install, service, adjust and troubleshoot hydraulic systems
- Read construction, electrical and mechanical blueprints
- Explain the use robotics in mechatronic systems

Installation and troubleshooting of PLC hardware



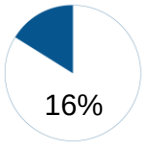
- Identify input and output terminals on the PLC
- Connect appropriate wires to each input and output
- Connect the wires to the applicable actuators and sensors
- Identify and apply technical specifications of a PLC

Application and troubleshooting of PLC software



- Identify & adjust program logic elements
- Utilize troubleshooting screens
- Establish communications among system components
- Differentiate between local and networked input and output devices
- Identify sequence of operations

Demonstrate basic knowledge of mechanical systems



- Identify and select appropriate mechanical components & tools
- Apply physics concepts to Mechatronics

Committee Identified Academic Skills

The SkillsUSA national technical committee has identified that the following academic skills are embedded in the mechatronics training program and assessment:

Math Skills

- Solve single variable algebraic expressions
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrixes

Science Skills

- Understand Law of Conservation of Matter and Energy
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets

Language Arts Skills

- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. To view high school standards, visit: http://www.nctm.org/standards/content.aspx?id=16909.

Science Standards

- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www.mcrel.org/standards-benchmarks/.

Language Arts Standards

- Students read a wide range of print and non-print texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.readwritethink.org/standards/index.html.