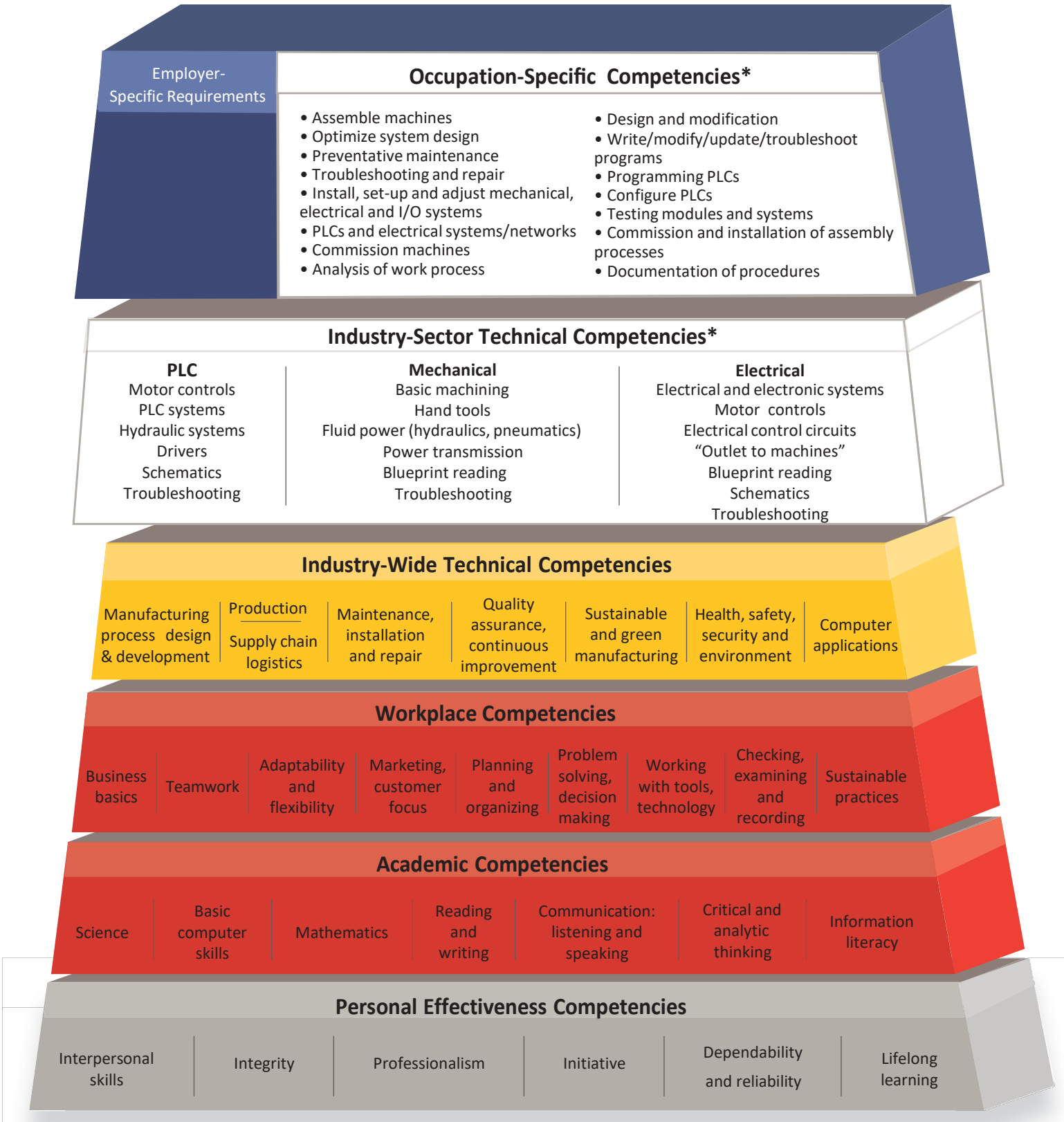
Minnesota Dual-Training Pipeline

Competency Model for Advanced Manufacturing
Occupation: Mechatronics Technician



Based on: Advanced Manufacturing Competency Model Employment and Training Administration, United States Department of Labor, April 2010.

*Pipeline recommends the Industry-Sector Technical Competencies as formal training opportunities (provided through related instruction) and the Occupation-Specific Competencies as on-the-job training opportunities

Mechatronics Technicians

Mechatronics Technicians require electrical, mechanical and computer skills necessary to work on complex systems found in manufacturing environments. The work includes basic electricity, fluid mechanics, mechanical drives, instrumentation, motor control and task specific to electrical, mechanical, and control specialties. The skills involved include industrial maintenance and manufacturing including assembly, testing, startup, troubleshooting, repair and upgrades of machinery and associated control systems.

Industry-Sector Technical Competencies

PLC

- Motor Controls – Understand industrial motor control principles including installation, maintenance, and repair principles
- PLC systems - Understand the functions and components of PLC systems in order to achieve desired outcomes.
- Hydraulic systems - Understand how hydraulic systems function and their applications and integration with PLCs.
- Drivers - Understand the components and applications of drivers in order to achieve desired outcomes.
- Schematics – Knowledge in properly reading schematics.
- Troubleshooting – Understanding how to troubleshoot PLC programs.

Mechanical

- Basic machining - Understand how to safely operate machinery and the theory behind machining functions.
- Hand tools – Understand when and how to safely use hand tools in machining processes.
- Fluid power (Hydraulics/Pneumatics) – Knowledge in operating, adjusting, servicing, andinstalling fluid power systems.
- Power transmission – Training in the function of power transmission and how to install, maintain and repair.
- Blueprint reading – Know how to interpret blueprints and use them to manufacture machines and parts.
- Troubleshooting - Training in use of tools and knowledge to repair machines and correct manufacturing issues.

Electrical

- Electrical and electronic systems – Understand how to safely operate, repair, and alter electrical units and electronic systems.
- Motor controls - Understand industrial motor control principles including installation, maintenance, and repair principles.
- Electrical control circuits - Learn how to safely operate and modify electrical control circuits.
- "Outlet to Machines" – Understand the theory of the electrical processes that happen from the electrical outlet to the machine.
- Blueprint reading – Know to how interpret blueprints and use them to build and repair machinery and electronic components.
- Schematics - Instruction in reading schematics and using them to build and repair machinery and electronic components.
- Troubleshooting - Training in use of tools and knowledge to repair electronics and machines.

Occupation-Specific Competencies

- Assemble machines – Know how to assemble machines given the proper tools, parts, and manuals. Understand how to connect wires and components for proper functionality.
- Optimize system design – Understand how to elevate system design to increase the efficiency of the machines/electronics and to decrease the cost of operation.
- Preventative maintenance – Know how to perform maintenance on machines and electronics to avoid potential technological breakdowns.
- Troubleshooting and repair – Able to troubleshoot issues and perform repair work.
- Install, set-up and adjust mechanical, electrical and I/O systems – Understand how to safely and properly install, set-up and adjust mechanical, electrical and Input/Output systems to ensure peak performance.
- PLCs and electrical systems/networks – Know how PLCs and electrical systems/networks work together and be able to connect them together.
- Commission machines – Know how to run machines with auxiliary equipment and PLCs using standards and documentation.
- Analysis of work process – Understand how to be able to evaluate and optimize work processes.
- Design and modification – Learn how to design and modify pneumatic, hydraulic andelectrical circuits using modern software tools when appropriate.
- Write/modify/update/troubleshoot programs – Know how to create programs and execute the necessary maintenance and troubleshooting procedures for programs operating machines and electronics.
- Programming PLCs – Demonstrate PLC programming knowledge including digital and industrial field buses.
- Configure PLCs – Be able to configure all aspects of PLCs and associated control circuitry forcorrect machinery operation.

- Testing modules and systems – Understand how to perform test runs of modules and assembled systems.
- Commission and installation of assembly processes – Know how to commission and install the assembly to operationalize standards and respond to questions regarding machinery.
- Documentation of procedures – Be able to document procedures which represent work processes.

Mechatronics Technician Occupational Competency Training Plan

Related Instruction means an organized and systematic form of instruction designed to provide the apprentice with the knowledge of the theoretical and technical subjects related to the apprentice's trade of occupation, or industrial courses or, when of equivalent value, by correspondence, electronic media, or other forms or self-study approved by the commissioner.

	Course	**Course Description**	**Credit/Non-Credit**	**Hours Spent on Competency**
PLCs: • Motor Controls • PLC Systems • Hydraulic Systems • Drivers • Schematics • Troubleshooting				
Mechanical: • Basic Machining • Hand Tools • Fluid Power (hydraulics/ pneumatics) • Power Transmission • Blueprint Reading • Troubleshooting				
Electrical: • Electrical and Electronic Systems • Motor Controls • Electrical Control Circuits • "Outlet to Machines" • Blueprint Reading • Schematics • Troubleshooting				

On-The-Job Training is the work experience and instruction. Training experience need not be in the exact order as listed below.

	Trainer/Instructor	**Name of person responsible for verifying competency mastery**	**Hours spent on competency**
Assemble machines			
Optimize system design			
Preventative maintenance			

Troubleshooting and repair			
Install, set-up and adjust mechanical, electrical and I/O systems			
PLC's and electrical systems/ networks			
Commission machines			
Analysis of work process			
Design and modification			
Write/ modify/ update/ troubleshoot programs			
Programming PLC's			
Configure PLC's			
Testing modules and systems			
Commission and installation of assembly processes			
Documentation of procedures			