

Competency Statements: 14.4201 Mechatronics (2023)

Electrical Components & Systems	Mechanical Components & Systems	Hydraulic & Pneumatic Components & Systems
Analyze, explain, and demonstrate fundamental elements & components of electricity within a mechatronic system (including tools and equipment). B1	Analyze, explain and demonstrate fundamentals elements of varying mechanical components & systems utilized in mechatronics (including tools and equipment). B2	Analyze, explain and demonstrate various pneumatic and hydraulic systems in complex mechatronic systems and subsystems. C1
Mechatronics Engineering, Business and Technology - Concepts & Principles	Blueprint Reading/Schematics/Computer Aided Design (CAD)	Control Systems
Explain concepts and processes for the application of technology to engineering including information management, planning and time management techniques. A2	Demonstrate the ability to interpret a variety of drawings utilized in mechatronics such as but not limited to: blueprints, schematics, and CAD documents. A5	Analyze, explain and demonstrate concepts associated with a variety of controls and sensors utilized in mechatronics. C2
Explain concepts of Manufacturing processes surrounding design, implementation, and execution of lean production. A3	Use computer aided design software to create a variety of drawings/designs utilized in Mechatronics. D1	Create and operate various circuits using devices such as solenoid valves, relays, limit switches and cylinders. C3
Explain principle operations of the mechatronic system and its subsystems, and the inter-relationships of components and modules within a system. A4	Subtractive Manufacturing	Demonstrate design, programming & maintenance of programmable logic controllers in complex mechatronic systems, modules and subsystems. C4
Additive Manufacturing	Demonstrate the ability to set up and operate shop machinery: lathe, mill, drill press, and grinder to handbook specifications. D2	Robotics
Demonstrate the ability to develop and print 3D Parametric Models using software & 3D Printers, utilizing appropriate modeling & prototyping. D5	Demonstrate the ability to utilize Basic & Precision Measurement devices. D3	Explain and demonstrate understanding of the concepts of Industrial Robotics including axis theory, point teaching, general programming, setup, and robotic safety principles. C5
Safety, Health and the Environment	Demonstrate the ability to setup, program, troubleshoot, modify, and operate CNC equipment. D4	
Demonstrate industrial and personal safety skills as recognized by the Manufacturing industry standards. A1		

Orange Font = PCC Competency Code (A1 = PCC A, Competency Statement 1)

Career Ready Practices*
Refer to the Career Ready Practices tab for standards and performance indicators
Demonstrate problem solving skills consistently and independently
Demonstrate collaboration skills consistently and independently
Demonstrate personal management skills consistently and independently
Demonstrate communication skills consistently and independently
*Required for ALL CTE programs. Not reported in CTEIS. Monitored through CIP Self-review and TRAC review.

Career Ready Practices are required for ALL Michigan Career and Technical Education programs(reformatted 2022-print one page, landscape)

Competency	Problem Solving (PS)	Competency	Collaboration (CL)	Competency	Personal Management (PM)	Competency	Communication (CM)
PS Competency Statement	Demonstrate problem solving skills consistently and independently	CL Competency Statement	Demonstrate collaboration skills consistently and independently	PM Competency Statement	Demonstrate personal management skills consistently and independently	CM Competency Statement	Demonstrate communication skills consistently and independently
PS1 Standard	Employ valid and reliable research strategies	CL1 Standard	Work productively in teams while using cultural global competence	PM1 Standard	Attend to personal health and financial well-being	CM1 Standard	Communicate clearly and effectively and with reason
PS1A	Evaluate validity of sources	CL1A	Contribute to every team, whether formal or informal	PM1A	Understand the relationship between personal health, workplace performance and personal well being	CM1A	Communicate thoughts, ideas and action plans with clarity, whether using written, verbal and/or visual methods
PS1B	Use an informed process to research new information and test new ideas and practices	CL1B	Apply awareness of cultural differences to avoid barriers to productive and positive interaction	PM1B	Act on an understanding to regularly practice healthy diet, exercise, and mental health activities	CM1B	Communicate in the workplace with clarity and purpose to make maximum use of your own and others' time
PS1C	Discern accepting and using information to make informed decisions	CL1C	Increase the engagement and contribution of all team members	PM1C	Take regular action to contribute to personal financial well-being	CM1C	Write master conventions, word choice and organization, and use effective tone and presentation skills to articulate ideas
PS2 Standard	Consider the environmental, social and economic impacts of decisions	CL1D	Plan and facilitate effective team meetings (in person and virtual)	PM1D	Recognize that personal financial security provides the peace of mind required to contribute more fully to career success	CM1D	Interact with others; actively listen and speak clearly and with purpose
PS2A	Understand the interrelated nature of actions and their impact	CL2 Standard	Act as a responsible and contributing citizen and employee	PM2 Standard	Plan education and career paths aligned to personal goals	CM1E	Consider the audience for all communications and prepare accordingly to ensure the desired outcome
PS2B	Make decisions that positively impact or mitigate negative impact on the environment and others	CL2A	Understand the obligations and responsibilities of being a member of a community and demonstrate this understanding through interactions with others	PM2A	Take personal ownership of educational goals and career goals and regularly act on a plan to attain these goals	CM2 Standard	Use technology to enhance productivity
PS2C	Be aware of new resources, procedures, technologies, and materials and their impact on the environment, social condition and the organization	CL2B	Be conscientious of the impact of decisions on others and the environment	PM2B	Understand personal interests, preferences, and goals	CM2A	Maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems
PS3 Standard	Utilize critical thinking to make sense of problems & persevere in solving them	CL2C	Identify the near-term and long-term consequences of actions and seeking to act in ways that contribute to the betterment of the team, family, community, and workplace	PM2C	Display perspective regarding the career pathways available and the time, effort, experience, and other requirements to pursue each, including the path of entrepreneurship	CM2B	Flexible and adaptive in acquiring and using new technology
PS3A	Recognize problems in the workplace, understanding the nature of the problem and devising effective plans to solve the problem	CL2D	Be reliable and consistent in going beyond the minimum expectations and participating in activities that serve the greater good	PM2D	Recognize the value of each step in the educational and experiential process	CM2C	Proficient with ubiquitous technology applications
PS3B	Recognize problems as they occur and take action to quickly address the problem	CL3 Standard	Model integrity, ethical leadership and effective management	PM2E	Recognize that nearly all career paths require ongoing education and experience	CM2D	Understand and take actions to prevent or mitigate inherent risks of technology applications both personal and organizational
PS3C	Investigate the root cause of the problem prior to introducing solutions	CL3A	Consistently act in ways that align to personal and community-held ideals and principles	PM2F	Seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals		
PS3D	Carefully consider the options to solve the problem	CL3B	Employ strategies to positively influence others in the workplace				
PS3E	Follow through with the agreed upon solution to ensure the problem is solved, either by your own actions or that of others	CL3C	Understand integrity and act on this understanding in every decision				
PS4 Standard	Demonstrate creativity and innovation	CL3D	Use a variety of means to positively impact the direction and actions of a team or organization				
PS4A	Regularly think of ideas that solve problems in new and different ways	CL3E	Apply insights into human behavior to change others' actions, attitudes and/or beliefs				
PS4B	Contribute ideas in a useful and productive manner to improve the organization	CL3F	Recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morale, and organizational culture				
PS4C	Consider unconventional ideas and suggestions as solutions to issues, tasks or problems and distinguish which ideas will add greatest value						
PS4D	Seek new methods, practices and ideas from a variety of sources and seek to apply those ideas to the workplace						
PS4E	Take action on ideas and understand how to bring innovation to an organization						
PS5 Standard	Apply appropriate academic and technical skills						
PS5A	Use knowledge and skills to be productive						
PS5B	Make connections between abstract concepts and real-world applications						
PS5C	Make correct insights and apply academic skills in the workplace as appropriate						

COLOR KEY

Problem Solving (PS) Standards PS1, PS2, PS3, PS4, PS5
PS Performance Indicators: PS1A-1C, PS2A-2C, PS3A-3E, PS4A-4E, PS5A-5C
Collaboration (CL) Standards CL1, CL2, CL3
CL Performance Indicators: CL1A-1E, CL2A-2D, CL3A-3F
Personal Management (PM) Standards PM1, PM2
PM Performance Indicators: PM1A-1E, and PM2A-2F
Communication (CM) Standards CM1, CM2
CM Performance Indicators: CM1A-1E, CM2A-2D

Source:
<https://careertech.org/career-ready-practices>