

Manufacturing Product/Process Development Pathway

Grade	Project Lead the Way	Certifications	OR	Engineering by Design	Certifications	Related Academics	College or dual credit?
12th State: 2101AA001	<i>Computer Integrated Manufacturing</i>	PLTW exam for articulated credit; and National Career Readiness Certificate		<i>Advanced Technological Applications</i> State: 2105AA003 In this course, students study four components of the Designed World including Information Technology, Agriculture and Bio-related Technologies, Medical, and Entertainment/Recreation. The social and ethical implications of product and systems innovations are also studied.	National Career Readiness Certificate	Math: Pre-calculus; or Calculus Science: a four year science sequence	There is articulated credit offered by some colleges for PLTW if score well on exams
11th State: 21008AA001	<i>Digital Electronics</i>			<i>Advanced Design Applications</i> State: 2105AA002 This course consists of four units including Manufacturing, Energy and Power, Construction and Transportation. Each unit provides an examination of particular aspects in these fields such as advances that maintain manufacturing efficiency, factors influencing the design of structures, how power systems may be utilized in problem solving, and the impact of transportation technologies on society and culture.		Math: Algebra II and Trig (Advanced Algebra and Trig) Science: a four year science sequence	There is articulated credit offered by some colleges for PLTW if score well on exams
10th State: 21004AA001	<i>Principles of Engineering</i>			<i>Technological Design</i> State: 2105AA001 Engineering scope, content, and professional practices are presented through practical applications. Students working in teams research, develop, test, and analyze engineering designs using criteria such as design effectiveness, public safety, human factors, and ethics.		Math: Geometry or Advanced Algebra Science: a four year science sequence	
9th State: 21006AA001	<i>Introduction of Engineering Design</i>			<i>Foundations of Technology</i> State: 21052AA001 Focuses on the three dimensions of technological literacy: knowledge, ways of thinking and acting, and capabilities, so students develop as technology literate citizens. It engages students in exploring and deepening their understanding of "big ideas" regarding technology. Involves language arts, math and science applications linked to state standards.		Math: Must take Algebra 1 concurrently Science: a four year science sequence such as biology, chemistry, physics, and an advanced science or an applied science course	

Production Pathways					
CIP code: 48.0501, Machine Tool Technology/Machinist					
Precision Machining (NIMS pathway)					
Grade/course	CNC Machining	Certifications	Alt. Certification	Related Academics	College or dual credit?
12th	<p>1.0 Unit Technology</p> <p>Focuses on CNC machining operation, setup and programming with mills and lathes. Course content is based on NIMS standards for CNC machining and focuses on students earning the NIMS CNC Operator credential. Includes topics in heat treating and metal finishing and an introduction to Geometric Dimensioning & Tolerancing.</p> <p>Computer simulators of CNC machines and on-line learning tools will allow students to learn programming basics without access to machine tools. NIMS certifications require use of CNC machine tools.</p>	<p>NIMS Machining Level 1 CNC Operator (Turning or Milling) OR NIMS Level 1 CNC Programming, Setup and Operations (Turning or Milling) AND National Career Readiness Certificate</p>	<p>MSSC CPT Maintenance Awareness AND National Career Readiness Certificate</p>	<p>Math Must take Trigonometry concurrently or have completed a course including trig</p> <p>Science: Biology or Physics (or other as required for graduation)</p>	<p>6 credit hours for NIMS CNC Prg. S/U and Operate, or 3 or hrs for NIMS CNC Operator Gateway to AAS Mfg Tech programs</p>
11th	<p>1.0 Unit Technology</p> <p>Fundamentals of Machining</p> <p>Provides students with basic technical skills needed in precision machining. It also includes and introduction to CNC technology. Topics include shop safety, hand tool use, print reading, operation and maintenance of machine tools, precision measurement, layout, quality assurance, manufacturing processes and materials, and job planning.</p>	<p>NIMS Machining Level 1 MMS OR another Level 1 NIMS if school has machine tools</p>	<p>MSSC CPT Manufacturing Processes and Production</p>	<p>Math: Algebra II and Trig or Advanced Algebra (without trig)</p> <p>Science: Chemistry</p>	<p>3 or hrs for NIMS MMS (print reading/metrology)</p>
10th	<p>0.5 Unit Science/0.5 Unit Technical Education</p> <p>Principles of Technology II (with Industry applications)</p> <p>This course is the second in a sequence designed to provide students with a firm foundation in physical science as it related to technology and engineering. Topics of study are in the areas of momentum, waves & vibrations, energy converters, transducers, radiation, light & optical systems, and time constants. Students will explore physics concepts as they solve problems relating to physical knowledge to energy, manufacturing, transportation, distribution and logistics, architecture and construction and information technology. Students will participate in hands-on activities that may include collaboration with local professionals.</p>	<p>MSSC CPT Quality Practices and Measurement</p>		<p>Math: Geometry</p>	
9th	<p>0.5 Unit Science/0.5 Unit Technical Education</p> <p>Principles of Technology I (with Industry Applications)</p> <p>This course is designed to reinforce and extend students understanding of physical science and the scientific process by associating scientific and math principles and concepts with relevant applications in technology and engineering. Topics of study are in the areas of force, work, rate, resistance, energy, power, and force transformers. Students will explore physics concepts as they solve problems relating to energy, manufacturing, transportation, distribution and logistics, architecture and construction and information technology. Students will participate in hands-on activities that may include collaboration with local professionals.</p>		<p>MSSC CPT - Safety</p>	<p>Math: Algebra 1</p>	
State: 21001A001					

Production Pathways

Grade/course	Welding	Certifications	Alt. Certification	Related Academics	College or dual credit?
12th	Welding Technology II <i>1.0 Unit Technology</i>	At least 2 AWS Qualifications such as: -D1.1 GMAW horizontal (steel) -D1.1 GTAW horizontal (aluminum) -D1.3 GTAW horizontal (steel or aluminum) AND National Career Readiness Certificate	MSSC CPT Maintenance Awareness AND National Career Readiness Certificate	Math: Statistics, Finite mathematics or Trigonometry are recommended Science: Biology or Physics (or other as required for graduation)	This course is a gateway to AAS programs in machining and manufacturing technology
11th	Welding Technology I <i>1.0 Unit Technology</i>	At least 2 AWS Qualifications (steel) such as: -D1.1 SMAW flat -D1.1 GMAW flat -D1.3 GTAW flat	MSSC CPT Manufacturing Processes and Production	Math: Algebra II and Trig or Advanced Algebra (without trig) Science: Chemistry	3 or hrs for NIMS MMS (print reading/metrology)
10th	Principles of Technology II (with industry applications) <i>0.5 Unit Science/0.5 Unit Technical Education</i>	MSSC CPT Quality Practices and Measurement		Math: Geometry	
9th	Principles of Technology I (with Industry Applications) <i>0.5 Unit Science/0.5 Unit Technical Education</i>	MSSC CPT - Safety		Math: Algebra 1	

This course is designed to reinforce and extend students understanding of physical science and the scientific process by associating scientific and math principles and concepts with relevant applications in technology and engineering. Topics of study are in the areas of force, work, rate, resistance, energy, power, and force transformers. Students will explore physics concepts as they solve problems relating to energy, manufacturing, transportation, distribution and logistics, architecture and construction and information technology. Students will participate in hands-on activities that may include collaboration with local professionals.

Production Pathways

Grade/course	Manufacturing Technology (MSSC) <i>The Business of Manufacturing</i>	Certifications	Related Academics	College or dual credit?
12th	<p>This course combines new concepts such as "Lean" manufacturing, and quality management systems with topics covered in previous courses to give students an understanding of manufacturing as a business. For example, Mean Time Between Failure and FMEA show critical nature of maintenance systems for companies. Students also prepare for the MSSC Maintenance Awareness module. Additional technical skills may be included based on the schools resources and partnerships.</p> <p>1.0 Unit Technology</p>	<p>MSSC CPT Maintenance Awareness AND National Career Readiness Certificate</p>	<p>Math: Statistics or Finite Mathematics are recommended. Science: Biology or Physics (or other as required for graduation)</p>	<p>6 credit hours for MSSC Certified Production Technologist (cf. Ivy Tech)</p> <p>This course is a gateway to AAS in mfg technology</p>
11th	<p>Fundamentals of Manufacturing</p> <p>1.0 Unit Technology</p>	<p>MSSC CPT Manufacturing Processes and Production</p>	<p>Math: Algebra II and Trig or Advanced Algebra (without trig) Science: Chemistry</p>	
10th	<p>Principles of Technology II (with industry applications)</p> <p>0.5 Unit Science/0.5 Unit Technical Education</p>	<p>MSSC CPT Quality Practices and Measurement</p>	<p>Math: Geometry</p>	
9th	<p>Principles of Technology I (with Industry Applications)</p> <p>0.5 Unit Science/0.5 Unit Technical Education</p>	<p>MSSC CPT - Safety</p>	<p>Math: Algebra 1</p>	

This course is designed to reinforce and extend students understanding of physical science and the scientific process by associating scientific and math principles and concepts with relevant applications in technology and engineering. Topics of study are in the areas of force, work, rate, resistance, energy, power, and force transformers. Students will explore physics concepts as they solve problems relating to energy, manufacturing, transportation, distribution and logistics, architecture and construction and information technology. Students will participate in hands-on activities that may include collaboration with local professionals.

Automation Pathway		This pathway is shared by Energy, Mfg, TDL, Bldg Maint/Construction		
CIP codes: 15.0405 Robotics; 47.0303 Industrial Mechanics and Maintenance Technology		Certifications	Related Academics	College or dual credit?
Grade	Automated Systems and Robotics			
12th	Robotics (Automation III) <i>1.0 Unit Technology</i>	Note: MSSC is for students interested in manufacturing		
State: 21009A001	This capstone course builds on the fundamentals of process/production automation learned in Automation I and allows student to demonstrate their competency as well ability to apply their knowledge. New topics of study include digital electronics, National Electrical Code, test equipment, print reading, motors & generators, troubleshooting, programmable logic controller (PLC), as well as topics accepted from local professionals working in STEM related occupations. Students will apply physics concepts during hands-on activities as they solve problems relating to energy, manufacturing, transportation, distribution and logistics, architecture and construction and information technology. Students will participate in hands-on activities that may include collaboration with local professionals.	MSSC CPT Maintenance Awareness AND/OR National Career Readiness Certificate	Math: Pre-calculus, Statistics, Finite mathematics Science: Biology, Physics (or other as required for graduation)	Potential for a total of 6 semester credit hours in college credit in DCIAC electricity, power transmission, machine repair, robotics, integrated systems, or similar fields. Completing the MSSC CPT can be worth 6 cr hrs (e.g. print reading, quality assurance)
11th	Mechatronics (Automation I) <i>1.0 Unit Technology</i>			
State: 13102A001	This course provides students with the electrical/mechanical fundamentals as it applies to automation in the fields of energy, manufacturing, transportation, inventory and logistics, building science, and information technology. Topics of study include DC & AC circuits, residential & commercial wiring, mechanical and fluid power transmission, piping, fluid and electrical controls, quality assurance, and resource planning. Students will participate in hands-on activities that may include collaboration with local professionals.	MSSC CPT Mfg Processes & Production	Math: Algebra II and Trig Science: Chemistry	Potential for a total of 6 semester credit hours in college credit in basic electricity, basic power transmission, integrated systems, or similar fields.
10th	Principles of Technology II (with industry applications) <i>0.5 Unit Science/0.5 Unit Technical Education</i>			
State: 21001A002	This course is the second in a sequence designed to provide students with a firm foundation in physical science as it related to technology and engineering. Topics of study are in the areas of momentum, waves & vibrations, energy converters, transducers, radiation, light & optical systems, and time constants. Students will explore physics concepts as they solve problems relating to physical knowledge to energy, manufacturing, transportation, distribution and logistics, architecture and construction and information technology. Students will participate in hands-on activities that may include collaboration with local professionals.	MSSC CPT Quality Practices and Measurement	Math: Geometry	
9th	Principles of Technology I (with Industry Applications) <i>0.5 Unit Science/0.5 Unit Technical Education</i>			
State: 21001A001	This course is designed to reinforce and extend students understanding of physical science and the scientific process by associating scientific and math principles and concepts with relevant applications in technology and engineering. Topics of study are in the areas of force, work, rate, resistance, energy, power, and force transformers. Students will explore physics concepts as they solve problems relating to energy, manufacturing, transportation, distribution and logistics, architecture and construction and information technology. Students will participate in hands-on activities that may include collaboration with local professionals.	MSSC CPT - Safety	Must take Algebra 1 concurrently	

Logistics and Inventory Control Pathway

This pathway is being reviewed and adjusted by the TDL Working Group

Grade	Logistics and Warehousing	Certifications	Related Academics	College or dual credit?
12th	Warehousing Operations II Building on Warehouse Operations I, this course will go deeper into inventory control, parts identification and customer service. Topics include Enterprise Requirements planning (ERP), Warehouse management systems (WMS), and Customer Relationship Management (CRM) softwares. Supply logistics, supplier relations, inventory management decisions, purchasing, and packaging, Hazmat, and global logistics concepts are also covered.	MSSC Certified Logistics Technician	Math: Statistics or Finite Mathematics are recommended. Science: Biology or Physics (or other as required for graduation)	Possibly 6 credit hours (e.g. Daley College TRNS 154, 156) MSSC CLT could earn articulated credit.
11th	Warehousing Operations I This course provides knowledge and skills applicable to the Parts, Warehousing, and Inventory Management operations. Topics covered include safety, warehousing and distribution operations in manufacturing and retailing, traffic and transportation and customer service activities, inventory control, and the supply chain. This class will develop hands-on activities using warehouse simulation and computer applications for inventory control and resource planning.	MSSC Certified Logistics Associate AMD National Career Readiness Certificate	Math: Algebra II and Trig or Advanced Algebra (without trig) Science: Chemistry	
10th	Principles of Technology II (with industry applications) <i>0.5 Unit Science/0.5 Unit Technical Education</i> This course is the second in a sequence designed to provide students with a firm foundation in physical science as it related to technology and engineering. Topics of study are in the areas of momentum, waves & vibrations, energy converters, transducers, radiation, light & optical systems, and time constants. Students will explore physics concepts as they solve problems relating to physical knowledge to energy, manufacturing, transportation, distribution and logistics, architecture and construction and information technology. Students will participate in hands-on activities that may include collaboration with local professionals.	MSSC CPT Quality Practices and Measurement	Math: Geometry	
9th	Principles of Technology I (with industry Applications) <i>0.5 Unit Science/0.5 Unit Technical Education</i> This course is designed to reinforce and extend students understanding of physical science and the scientific process by associating scientific and math principles and concepts with relevant applications in technology and engineering. Topics of study are in the areas of force, work, rate, resistance, energy, power, and force transformers. Students will explore physics concepts as they solve problems relating to energy, manufacturing, transportation, distribution and logistics, architecture and construction and information technology. Students will participate in hands-on activities that may include collaboration with local professionals.	MSSC CPT - Safety	Math: Algebra 1	