Delaware Department of Education

CTE & STEM Office

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Dover, DE 19901

PHONE: 302.735.4015 FAX: 302.739.1780

**DELAWARE CTE PROGRAM OF STUDY APPLICATION**

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| LOCAL EDUCATION AGENCY INFORMATION | | |
| **Local Education Agency (LEA):** | | |
| **School(s) where the Program of Study will be Located:** | | **Program of Study Start Date:** |
| **LEA CTE Coordinator Name:** **Phone:** **E-Mail Address:** | | |
| **Career Cluster Title:**  Manufacturing | **Career Pathway Title:**  Logistics and Inventory Control | **Program of Study Title:**  Manufacturing Logistics Technician |
| **CTE Program of Study Course Titles & Sequence:**   1. MSS100 - Principles of Manufacturing 2. MSS101 - Manufacturing Quality, Safety, and Practices 3. MSS102 - Manufacturing Processes and Production 4. MSS103 - Advanced Handling and Logistics | | |
| **CTE Program of Study Request:**  State-model CTE Program of Study  Local CTE Program of Study | | |
| ASSURANCES & SIGNATURES | | |
| CTE Program of Study approval and funding is contingent upon the following assurances:   1. The LEA will comply with Delaware Administrative Code, 14 Del.C. §525, Requirements for Career and Technical Education Programs and the Delaware State Plan for the Carl D. Perkins Career and Technical Education Act of 2006; 2. The LEA will submit CTE program data as required by the Delaware Department of Education; 3. All teachers are certified in the appropriate CTE area and participate in program specific professional learning; 4. The LEA will convene and engage a program advisory committee for the purposes of program development, implementation, and continuous improvement; 5. All students have equal access to the program of study as well as early career/early college options; 6. Career and Technical Student Organizations are integral components of the program of study; 7. The LEA will maintain safe facilities and equipment aligned with the program of study goals; and 8. A process for continuous improvement has been established, which includes a model of evaluation and program improvement. | | |
| LEA CTE Coordinator Signature: Date: | | |
| LEA Chief School Officer Signature: Date: | | |

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| PROGRAM ADVISORY COMMITTEE MEMBER INFORMATION |
| The Delaware Manufacturing Association (DMA) serves as the program advisory committee for the program of study (POS). The POS district representative must be the CTE/curriculum district coordinator. |
| Name: Title: |
| Affiliation: |
| Address: |
| Phone: E-Mail: |
| Area of Expertise: |
| Representing:  Secondary Education |
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| LABOR MARKET DEMAND |
| Certify that a labor market needs analysis has been completed for the proposed CTE program of study. Attach the [*Labor Market Information (LMI) Review*](http://www.doe.k12.de.us/Page/2016) document. |
| Access the [*Labor Market Information (LMI) Review*](http://www.doe.k12.de.us/Page/2016) document.  The LEA certifies that regional, state, and local labor market data have been reviewed to assure a demand exists for the POS occupations and that the number of POS completers will not significantly exceed this demand. Department of Labor data are available and/or documented. Supporting evidence of supply and demand is submitted with this proposal.  No data exist for POS due to a unique labor market demand. Supporting evidence of demand is submitted with this proposal. Evidence may include, but is not limited to: real-time labor market information, documentation of national, regional, state, or local labor trends, or letters from employers or workforce agencies documenting projected employment specific to the career pathway. |

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| ACADEMIC AND TECHNICAL SKILL STANDARDS |
| List the academic, technical, and workplace skills and knowledge used to develop the program of study. |
| **Title and source of academic standards:**  [Common Core State Standards (CCSS)](http://www.corestandards.org/)  The Common Core State Standards (CCSS) are national standards that set clear college- and career-ready expectations for kindergarten through 12th grade in English language arts/literacy and Mathematics. The standards help to ensure that students graduating from high school are prepared to take credit bearing introductory courses in two- or four-year college programs and enter the workforce. The standards were developed by the nation's governors and education commissioners, through their representative organizations, the National Governors Association Center for Best Practices (NGA) and the Council of Chief State School Officers (CCSSO). Teachers, parents, school administrators, and experts from across the country provided input into the development of the standards. The implementation of the Common Core, including how the standards are taught, the curriculum developed, and the materials used to support teachers as they help students reach the standards, is led entirely at the state and local levels. For more information on CCSS, please visit the link above.  Within the Manufacturing Logistics Technician program of study, the CCSS have been embedded in each course. The program has students apply the CCSS English language arts/literacy standards, specifically the College and Career Readiness Anchor Standards for Reading, Writing, and Speaking & Listening as well as the Literacy Standards for Science and Technical Subjects to engage in coursework and work as a team. Additionally, the program has students apply the CCSS Mathematics standards, specifically the Standards for Mathematical Practice as well as standards at the High School level to solve technical problems and operations.  [Next Generation Science Standards (NGSS)](http://www.nextgenscience.org/)  The Next Generation Science Standards (NGSS) are national standards for science that lay out the disciplinary core ideas, science and engineering practices, as well as crosscutting concepts that students should master in preparation for college and careers. The standards were developed through a state-led effort that was managed by Achieve. The development of the NGSS involved the National Research Council (NRC), the National Science Teachers Association (NSTA), the American Association for the Advancement of Science (AAAS), and other critical partners such as K–12 teachers, state science and policy staff, higher education faculty, scientists, engineers, cognitive scientists, and business leaders. For more information on the NGSS, please visit the link above.  Within the Manufacturing Logistics Technician program of study, the NGSS have been embedded in each course. The program has students apply the NGSS standards at the high school level, specifically the Physical Sciences as well as Engineering, Technology, and Applications of Science to develop and use models, analyze data, and design solutions. |
| **Title and source of technical skill standards:**  [Manufacturing Skill Standards Council (MSSC), Certified Logistics Associate (CLA):](http://www.msscusa.org/)  The MSSC CLA program measures student achievement as well as knowledge and skill development in manufacturing logistics, which includes: global supply chain; logistics life cycle; logistics environment; safe material handling and equipment operation; safety; quality control; workplace communications; teamwork and workplace behavior; problem solving; and the use of technology.  [Manufacturing Skill Standards Council (MSSC), Certified Logistics Technician (CLT)](http://www.msscusa.org/):  The MSSC CLT builds upon the knowledge and skills develop through the MSSC CLA and measures student achievement in manufacturing logistics, which includes: product receiving; product storage; order processing; packaging and shipment; inventory control; safe handling of hazmat materials; evaluation of transportation modes; dispatch and tracking; as well as measurement and metric conversions.  Successful certification in both assessment areas (CLA and CLT) allows students to earn the full Certified Logistics Technician (CLT) certification. For more information on the CLA or CLT, please visit the link above. |
| **Title and source of workplace or other skill standards, as applicable:**  [Common Career Technical Core (CCTC)](http://www.careertech.org/CCTC)  The Common Career Technical Core (CCTC) are national standards for Career & Technical Education (CTE) that help to inform the establishment of state standards and/or programs of study. The CCTC were developed by educators, school administrators, representatives from business and industry, faculty from higher education, as well as workforce and labor markets economists.  The CCTC includes a set of standards for each of the sixteen (16) Career Clusters and the corresponding Career Pathways that help to define what students should know and be able to do after completing instruction in a program of study. For more information on the CCTC, please visit the link above.  Within the Manufacturing Logistics Technician program of study, the CCTC standards for the Manufacturing Career Cluster have been embedded in each course. The program has students apply the CCTC Manufacturing standards, specifically the [Logistics & Inventory Control](http://www.careertech.org/manufacturing) Career Pathway standards.  [Career Ready Practices (CRP)](http://www.careertech.org/career-ready-practices)  The Career Ready Practices (CRP) are a component of the CCTC framework and includes twelve (12) statements that address the knowledge, skills, and dispositions that are important to becoming career ready. The CRP describes the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline, or level of education and should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a career pathway. For more information on the CRP, please visit the link above.  Within the Manufacturing Logistics Technician program of study, the CRP statements are embedded throughout the program to ensure students display the appropriate workplace and soft skills required to be successful in a career. |

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| EARLY CAREER AND EARLY COLLEGE OPPORTUNITIES |
| Identify CTE program of study early career opportunities, industry-recognized certifications and licenses, options for early college credit, two- and four-year degree and certification program alignment, and the technical skill attainment measures for the program of study. *Attach articulation/dual enrollment agreement(s)*. |
| **Describe early career opportunities (i.e. work-based learning experiences and industry-mentored projects):**  The Manufacturing Logistics Technician program of study provides students with paid work-based learning experiences or Craftsmanship Placements upon successful completion of the MSS100 - Principles of Manufacturing and MSS101 - Manufacturing Quality, Safety, and Practices courses. Craftsmanship Placements will be organized and supported by the Delaware Manufactures Association and by the Delaware Technical Community College. The administration and supervision of the Craftsmanship Placements will be conducted by the participating local education agency, Delaware Technical Community College faculty, and the participating manufacturing supervisor(s). |
| **List industry-recognized certifications and/or licenses, as appropriate (include the partner organization and credential):**   * [**Manufacturing Skill Standards Council, Certified Logistics Associate (CLA):**](http://www.msscusa.org/)   The Certified Logistics Associate (CLA) measures student knowledge and skill development in the following topics: manufacturing logistics; global supply chain logistics; logistics life cycle; logistics environment; material handling; safety; safe material handling and equipment operation; quality control principles; workplace communications; teamwork and workplace behavior; problem solving; and use of technology.   * [**Manufacturing Skill Standards Council, Certified Logistics Technician (CLT)**](http://www.msscusa.org/)**:**   The Certified Logistics Technician (CLT) builds upon the knowledge and skills develop through the MSSC CLA and measures student achievement in manufacturing logistics, which includes: product receiving; product storage; order processing; packaging and shipment; inventory control; safe handling of hazmat materials; evaluation of transportation modes; dispatch and tracking; as well as measurement and metric conversions.   * [**American Heart Association; First Aid CPR/AED Certification**](http://www.heart.org/HEARTORG/)**:**   The American Heart Association First Aid CPR/AED certification provides students with the critical skills needed to respond to and manage a first aid, choking, or sudden cardiac arrest emergency until emergency medical services arrive.  Additionally, students learn how to treat bleeding, sprains, broken bones, shock, and other first aid emergencies.   * [**Occupational Safety and Health Administration; 10-Hour Construction Safety Certification**](https://www.osha.gov/)**:**   The OSHA 10-hour training is an entry level certification in the recognition, avoidance, abatement, and prevention of safety and health hazards in the construction workplace. The program also provides information regarding workers' rights, employer responsibilities, and how to file a complaint.   * [**Occupational Safety and Health Administration; 3 Hour Safety Refresher Certification**](https://www.osha.gov/)**:**   The OSHA 3-hour training is a refresher certification in the recognition, avoidance, abatement, and prevention of safety and health hazards in the construction workplace as well as information regarding workers' rights, employer responsibilities, and how to file a complaint.   * [**Delaware Technical Community College Certification**](https://www.dtcc.edu/)**:**   Upon successful completion of the program, students will earn a certification of completion from the DTCC office of Workforce Development and Community Education. The document will certify the students have successfully completed the core coursework and program competencies. |
| **Describe early college credit options (i.e. advanced placement, dual enrollment, transcripted and/or articulated credit, credit by exam, pre-apprenticeship, other) and options for two- and four-year degree and/or certification program alignment (attach articulation/dual enrollment agreement). The partner organization and hours of credit earned should be included, as applicable:**  The Manufacturing Logistics Technician program of study is a two (2) year, four (4) semester program of study that is articulated with Delaware Technical Community College. Students gain articulated credit that can be applied at Delaware Technical Community College in the following associate degree programs:  [Delaware Technical Community College](https://www.dtcc.edu/academics/programs-study), [Operations Management](https://www.dtcc.edu/academics/programs-study/operations-management): 7 articulated credits   * OMT100 – Operation Management: 4 credits * OMT240 – Supply Chain Management: 3 credits   [Delaware Technical Community College](https://www.dtcc.edu/academics/programs-study), [Electromechanical Engineering Technology](https://www.dtcc.edu/academics/programs-study/electromechanical): 3 articulated credits   * ELM205 - Mechanisms & Design: 3 credits   For more information, please review attached articulation agreements. |
| **List technical skill attainment measures for the program of study (i.e. industry recognized certification or license, advanced placement, dual enrollment, transcripted and/or articulated credit, dual enrollment, credit by exam):**  Certification/credentialing exam (specify):  [Manufacturing Skill Standards Council, Certified Logistics Technician (CLT)](http://www.msscusa.org/)  Licensing exam (specify):  Nationally recognized exam (specify):  Advanced standing (specify):  Delaware Technical Community College:  OMT100 – Operation Management: 4 credit  OMT240 – Supply Chain Management: 3 credit  ELM205 – Mechanisms & Design: 3 credit  Other (specify): |

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| POS OVERVIEW, COURSE DESCRIPTIONS, END-OF-COURSE, AND PROGRAM ASSESSMENTS |
| Provide a CTE program of study overview that broadly describes the program and student expectations. Identify end-of-program assessment(s) and opportunities for students to participate in early college and early career experiences. List each course title in the CTE program of study. Provide an overview of each course and define what students should know and be able to demonstrate upon completion of each level. Identify appropriate end-of-course assessment(s). |
| **CTE Program of Study Overview:**  TheManufacturing Logistics Technician program of study is a two (2) year; four (4) semester Career & Technical Education (CTE) instructional program that engages students in open-ended problem solving where they learn and apply manufacturing processes and use modern, industry-leading technology and software. The program prepares students for further education and careers in manufacturing and logistics. The CTE program consists of four courses that are completed on the campus of the Delaware Technical Community College.  Paid work-based learning experiences or Craftsmanship Placements will be available to students upon successful completion of the MSS100 - Principles of Manufacturing and MSS101 - Manufacturing Quality, Safety, and Practices courses. Craftsmanship Placements will be organized and supported by the Delaware Manufactures Association and by the Delaware Technical Community College. The administration and supervision of the Craftsmanship Placements will be conducted by the participating local education agency, Delaware Technical Community College faculty, and the participating manufacturing supervisor(s).   * **(Semester 1) MSS100 – Principles of Manufacturing** provides students with the foundational skills needed to start a career in today’s manufacturing industry. In this course, students will learn about proper tool use, production assembly, mechanical print reading, electrical wiring, welding, lock out-tag out, OSHA safety, and key manufacturing mathematical concepts. At the conclusion of this course, students will be prepared for entry into the workforce and/or continued training in a Manufacturing Pathway. * **(Semester 2) MSS101 – Manufacturing Quality, Safety, and Practices** provides students with real-world applications in Manufacturing Quality, Safety, and Practices. This course will focus on quality and measurement, emergency and fire safety, emergency and incident management, basic life support, material handling equipment, and computer spreadsheet applications. * **(Semester 3) MSS102 – Manufacturing Processes and Production** provides students with advanced knowledge of Manufacturing Processes and Production. This course will focus on tool and equipment safety, preventative equipment maintenance and repair, as well as 5-S and Lean Manufacturing processes. * **(Semester 4) MSS103 – Advanced Handling and Logistics** provides students with advanced handling and logistics skills. This course will focus on the manufacturing global supply chain, manufacturing processes, packaging, material processing, inventory control, and transportation. Students will have the opportunity to practice, prepare for, and complete the Manufacturing Skill Standards Council (MSSC) National Certification Exam(s). |
| **End-of-Program Assessment(s):**  Certification/credentialing exam (specify):  Manufacturing Skill Standards Council, Certified Logistics Technician (MSSC, CLT)  Licensing exam (specify):  Nationally recognized exam (specify):  Other (specify): |
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| **Course title:**  MSS100 – Principles of Manufacturing |
| **Course description (include prerequisites):**  MSS100 – The Principles of Manufacturing course provide students with the foundational skills needed to start a career in today’s manufacturing industry. In this course, students will learn about proper tool use, production assembly, mechanical print reading, electrical wiring, welding, lock out-tag out, OSHA safety, and key manufacturing mathematical concepts. At the conclusion of this course, students will be prepared for entry into the workforce and/or continued training in a Manufacturing Pathway.  Prerequisite or Concurrent Enrollment Requirement:Algebra I |
| **Course knowledge and skills (what students will know and be able to do):**  By the end of this course, students will:   1. Perform algebraic operations and solve applied mathematical problems needed in manufacturing to: manipulate algebraic operations; solve linear equations; apply rates, ratios and proportions; apply US and metric measurement system to model solutions; perform dimensional analysis using decimals and percentages; as well as solve applied problems using plane and solid geometry. 2. Interpret and demonstrate blueprint and schematic reading to: identify line types and interpret their meaning; identify abbreviations, symbols, and terminology and their appropriate applications; dissect orthographic projections; interpret geometric, dimensioning, and tolerance standards; as well as describe the types and functions of technical drawings and language. 3. Demonstrate techniques, skills and process in order to: properly select and use electrical tools; troubleshoot electrical circuits and components; demonstrate electrical safety practices; practice lock-out/tag-out procedures; install electrical components; and perform proper installation of circuit protection (circuit breaker in service panel). 4. Apply proper mechanical fabrication techniques that include: selection of fasteners for manufacturing; use of production tools for mechanical fabrication; installation of pressurized pneumatic tubes and fittings; manufacturing of parts using industrial fasteners; as well as practice safe and proper use of equipment and tools. 5. Practice modern production assembly techniques to: apply the safe and proper use of torque wrenches; demonstrate proper assembly of mechanical fasteners with the selection and proper installation of pressurized various seals; as well as install hydraulic hoses, fittings and tubing to industrial equipment. 6. Apply OSHA construction and safety practices and procedures through: explanation of the function and purpose of worker rights; selection of Personal Protective Equipment (PPE) to industry standards; identification of health hazards encountered on worksites; prevention techniques to identify and reduce injuries associated with material handling, storage, use, and disposal; practice the elimination of hazards in lifting, using forklifts, cranes, scaffolding, slings and/or when storing, using, or disposing of materials; perform an environmental survey to prevent slipping, tripping, and falling hazards; demonstrate safe use of ladders on a site; illustrate precautions for the safe use of tools; and debate OSHA rules and regulations as applied to safety and health in the workplace.   7. Perform career exploration activities in the manufacturing industry through: research and reporting on career opportunities in manufacturing; presentation of need, demand, knowledge and skills required for entry into a career in manufacturing; practice career ready skills expected for growth into careers in manufacturing; and perform inquiries using engineering reference materials to solve technical problems. |
| **End-of-Course Assessment(s):**  Teacher designed assessment  LEA designed assessment  Certification/credentialing exam (specify): [OSHA, 10 Hour Construction Safety Certification](https://www.osha.gov/)  Licensing exam (specify):  Nationally recognized exam (specify): Manufacturing Skill Standards Council (MSSC) Safety Assessment and [Manufacturing Skill Standards Council (MSSC) Quality Practices & Measurement](http://www.msscusa.org/wp-content/uploads/file/CPT%20Key%20Activities%20Full%202012.pdf) Assessment  Other (specify): |
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| **Course title:**  MSS101 – Manufacturing Quality, Safety, and Practices |
| **Course description (include prerequisites):**  MSS101 – The Manufacturing Quality, Safety, and Practices course provides students with real-world applications in manufacturing quality, safety, and practices. This course will focus on quality and measurement, emergency and fire safety, emergency and incident management, basic life support, material handling equipment, and computer spreadsheet applications.  Prerequisite: MSS100 – Principles of Manufacturing |
| **Course knowledge and skills (what students will know and be able to do):**  By the end of this course, students will:   1. Examine quality practices in the logistics of manufacturing to: discuss the elements of Advanced Product Quality Planning (APQP); develop a definition for reliability and quality goals; apply the concepts of Design, Failure, Mode and Effect Analysis (DFMEA) and Design for Manufacturing and Assembly (DFMA); apply concepts of Process, Failure, Mode, and Effect Analysis (PFMEA); illustrate the concepts of Failure Mode and Effects Analysis (FMEA); analyze the relationship between APQP, PPAP, FMEAs, and Control Plans and Error Proofing; and illustrate the error and mistake-proofing concepts throughout the APQP process. 2. Practice the fundamental components of safety and emergency management to: create an emergency plan/fire prevention plan; practice emergency communication strategies and actions for reporting of an emergency; perform fire hazard surveys; describe the function of fire detection, alarm, and extinguishing systems; interpret principles of the Federal Emergency Management Agency (FEMA) and the National Incident Management System (NIMS); produce an emergency response plan; and demonstrate industrial hygiene practices. 3. Demonstrate essential life-saving skills to: practice principles of first response; apply skills necessary to deal with emergencies; apply life-saving skills to emergencies scenarios; and demonstrate first aid/CPR certification skills. 4. Demonstrate safe and effective use of material handling equipment to: practice the safe and effective operation of a hydraulic hand truck and forklift; perform a quality and safety inspections of material handling equipment; and apply principles of safe and proper loading and moving of logistics materials. 5. Design criteria for development of advanced Excel workbooks to: create and modify Excel workbooks; create and modify formulas, tables, and charts within Excel; use data to make decisions in supply chain logistics; apply formulas and measurements to solve problems; analyze data to make statistical models; evaluate formulas for missing or irrelevant data; construct charts/tables/graphs from functions and data; analyze data when interpreting operational documents; evaluate conclusions, conflicting data, controls, data, inferences, limitations, questions, sources of errors, and variables when using Excel. 6. Practice workplace readiness skills to: apply effective workplace communication skills; identify essential workplace readiness competencies; demonstrate effective workplace communication skills; as well as employ effective communication and workplace readiness skills. |
| **End-of-Course Assessment(s):**  Teacher designed assessment  LEA designed assessment  Certification/credentialing exam (specify): [American Heart Association; First Aid CPR/AED Certification](http://www.heart.org/HEARTORG/)  Licensing exam (specify):  Nationally recognized exam (specify):  Other (specify): |
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| **Course title:**  MSS102 – Manufacturing Processes and Production |
| **Course description (include prerequisites):**  MSS102 – The Manufacturing Processes and Production course provides students with advanced knowledge of manufacturing processes and production. This course will focus on tool and equipment safety, preventative equipment maintenance and repair, as well as 5-S and lean manufacturing processes.  Prerequisite: MSS101 – Manufacturing Quality, Safety, and Practices |
| **Course knowledge and skills (what students will know and be able to do):**  By the end of this course, students will:   1. Apply essential workplace safety practices to: conduct proper tool maintenance and handling practices; Maintain safe and healthful working conditions and environment to ensure employee safety; produce safety procedures for point of operation safety; apply practices in ergonomics; create safety plans to prevent risks involved with tasks that require repetition, force, or vibration; analyze essential safety protocols and procedures in the workplace; 2. Demonstrate best practices in OSHA construction safety to: assess workplace conditions according to specified safety and health requirements; demonstrate knowledge of rules and laws designed to promote safety and health and their rationale; summarize safety, health, and environmental management systems to build an understanding of compliance with governmental policies and procedures for manufacturing business; explain how government agencies ensure compliance with environmental regulations and promote improved performance. 3. Discuss the relationship between logistics and preventative maintenance to: debate reactive and preventative maintenance requirements; describe the evolution professional maintenance careers; practice predictive maintenance techniques; apply reliability-centered maintenance practices; demonstrate total productive maintenance techniques; practice methods for scheduling of maintenance tasks; outline tasks associated with creating a maintenance plan; and develop a Gantt chart for decision making and maintenance scheduling; use logistics and inventory control procedures and processes to meet business requirements; Use computer-based equipment (containing embedded computers or processors) to control devices; troubleshoot equipment and machines. 4. Practice Lean/5-S manufacturing approaches to: apply lean manufacturing concepts; debate the role of organizational standards in manufacturing; define techniques to reduce waste in manufacturing; contrast lean goals for various manufacturing enterprises; analyze techniques to increase productivity, reduce changeover times, reduce inventory and encourage continuous product flow; describe a cell and a pull system; determine sources of process variation; practice activities of the 5-S Approach; distinguish the importance of continuous improvement. |
| **End-of-Course Assessment(s):**  Teacher designed assessment  LEA designed assessment  Certification/credentialing exam (specify): [OSHA 3 Hour Safety Refresher Certification Course](https://www.osha.gov/)  Licensing exam (specify):  Nationally recognized exam (specify): [Manufacturing Skill Standards Council, Certified Logistics Associate](http://www.msscusa.org/wp-content/uploads/file/CLT%20Key%20Activities%202011.pdf) (MSSC, CLA)  Other (specify): |
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| **Course title:**  MSS103 – Advanced Handling and Logistics |
| **Course description (include prerequisites):**  MSS103 – The Advanced Handling and Logistics course provides students with advanced handling and logistics skills in manufacturing fields. This course will focus on the manufacturing global supply chain, manufacturing processes, packaging, material processing, inventory control, and transportation. Students will have the opportunity to practice, prepare for and complete the Manufacturing Skill Standards Council (MSSC) National Certification Exam(s).  Prerequisite: MSS102 – Manufacturing Processes and Production |
| **Course knowledge and skills (what students will know and be able to do):**  By the end of this course, students will:   1. Distinguish ideal processes for manufacturing to: analyze manufacturing production processes; differentiate factors that influence plant location(s); determine production environments; debate systems used for production scheduling; analyze types of material procurement, handling, and storage.      1. Determine criteria of packaging processes to: explain various manufacturing assembly systems; operate manufacturing process documentation; initiate use of machines used in manufacturing processes; practice ergonomics as it relates to manufacturing; create waste management plans; and determine optimum layout planning for manufacturing. 2. Model effective supply chain management to: explain analyze the purpose of a supply chain; interpret interactions within and amongst competitive global supply chains; determine procedures for implementing effective inventory controls; implement techniques to manage a supply chain; and express interconnected relationships amongst companies in supply chains. 3. Compare and contrast a responsive supply chains to efficient supply chains to: explain forecast manufacturing needs; illustrate modes of product transportation; determine criteria for just-in-time production; create criteria for customer service in supply chain management; debate factors that can impact customer retention related to supply chain management; and apply information technology protocols for effective supply chain management. 4. Create a project plan using Microsoft Project software to: produce Gantt charts in order to manage projects in logistics; assign and manage variables that can affect manufacturing production schedules; assign staffing to manufacturing operations; determine allocation of finances for production needs; determine human and capital needs to complete projects; manage product production and shipping schedules; analyze tracking, distribution and delivery timelines. 5. Practice and prepare for the national Manufacturing Skill Standards Council (MSSC) National Certification Exam(s) to: review materials from Logistics I & II; complete MSSC practice tests; complete the MSSC Certified Logistics Associate; and the MSSC Certified Logistics Technician National Certification Exam(s). |
| **End-of-Course Assessment(s):**  Teacher designed assessment  LEA designed assessment  Certification/credentialing exam (specify):  Licensing exam (specify):  Nationally recognized exam (specify): [Manufacturing Skill Standards Council, Certified Logistics Technician](http://www.msscusa.org/wp-content/uploads/file/CLT%20Key%20Activities%202011.pdf) (MSSC, CLT)  Other (specify): |

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| PROGRAM OF STUDY CURRICULUM |
| Identify the method of technical and academic curriculum development (adopted, adapted, or developed in accordance with guidance from the program advisory committee). |
| **POS technical and academic curriculum will be:**  Adopted (specify source): Adopted State-model CTE POS  Adapted (specify source):  Developed locally (describe):  Other (specify): |

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| TEACHER CERTIFICATION |
| Provide valid teacher certification(s), candidate experience, pre-requisite and requisite licensure or certification requirement(s) for POS teachers. |
| **POS teacher requirements include:**  Teacher certification(s) (list): Skilled and Technical Sciences (STS) Logistics and Inventory Control  Candidate experience (describe): Candidate may have experience in manufacturing logistics to analyze and coordinate an organization’s supply chain that moves a product from supplier to consumer throughout the life cycle of a product, which includes how a product is acquired, processed, distributed, allocated, and delivered. Tasks include purchasing, transportation, inventory, and warehousing. For more information, please see the Bureau of Labor Statistics: Logisticians.  Pre-requisite professional licensure or certification requirement(s) (list): Verified completion of at least 576 hours of specific Logistics and Inventory Control formal training above the high school level.  Requisite professional licensure or certification requirement(s) (list): Manufacturing Skill Standards Council (MSSC) Certified Logistics Technician (CLT) certification.  Other (describe): |

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| VALUE-ADDED OPPORTUNITIES |
| List extended early career and college credit opportunities available during the student’s senior year. Document transition services, cooperative learning experiences, additional dual enrollment, or other. |
| **Opportunities for extended and accelerated learning include:**  Cooperative education (describe):  Structured internship (describe):  Dual enrollment (list):  Advanced Placement (list):  Transition services (describe):  Other (describe): |

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| CAREER AND TECHNICAL STUDENT ORGANIZATIONS |
| Indicate the Career and Technical Student Organization (CTSO) affiliation by checking the appropriate box. |
| SkillsUSA  TSA |

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| PROGRAM OF STUDY MATRIX |
| Complete the program of study matrix to demonstrate the alignment of academic and technical courses, culminating early career and/or early college experiences. Identify appropriate certification and licensure options, opportunities for obtaining early college credit (courses with articulated or dual enrollment credit agreements should be appropriately designated within the matrix), the post-secondary program sequence, and potential career options. *Attach the Program of Study Matrix*. |
| Access the [Program of Study Matrix](http://www.doe.k12.de.us/Page/2016). |

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| DEPARTMENT OF EDUCATION PROGRAM OF STUDY APPROVAL | | |
| The following section will be completed by staff from the Delaware Department of Education, CTE & STEM Office and reported to the LEA as part of the CTE program of study approval process. | | |
| **Date Delaware CTE Program of Study Application Received:** | | |
| **Local Education Agency (LEA):**    **School(s):** | | **Program of Study Start Date:** |
| **LEA CTE Coordinator Name:** **Phone:** **E-Mail Address:** | | |
| **Career Cluster & Code:**  Manufacturing / 13 | **Career Pathway & Code:**  Logistics and Inventory Control / 13.05 | **Program of Study Title & Code:**  Manufacturing Logistics Technician / 13.05901 |
| **CTE Program of Study Course Titles, Course Codes, and Funding Levels:**  1. Principles of Manufacturing / 13.0590111 / 3  2. Manufacturing Quality, Safety, and Practices / 13.0590122 / 3  3. Manufacturing Processes and Production / 13.0590133 / 3  4. Advanced Handling and Logistics / 13.0590144 / 3 | | |
| **CTE Concentrator/Completer Course Titles:**  Concentrator Course: Manufacturing Quality, Safety, and Practices  Completer Course: Advanced Handling and Logistics | | |
| **CTE Program of Study Request:**  State-model CTE Program of Study  Local CTE Program of Study | | |
| **CTE Program of Study Attachments:**  Labor Market Information (LMI) Review;  Articulation/Dual Enrollment Agreement(s); and  Program of Study Matrix. | | |
| DDOE CTE & STEM Director Signature: Date: | | |
| DDOE Chief Academic Officer Signature: Date: | | |