MANUFACTURING TECHNOLOGY

The Manufacturing Technology Program at Mount Wachusett Community College provides students with the opportunity to earn a Manufacturing Technology -- Mechatronics Certificate or Associate Degree in Manufacturing Technology -- Plastics. Upon completion of the program, students are prepared for entry-level and mid-level positions in a variety of manufacturing and engineering settings. During the course of study, students will develop skills and competencies in the scientific and practical principles of design, development, operation, programming and repair of automated systems. Students will gain knowledge in mechatronics (electromechanical systems), robotics, programmable logic, hydraulics, pneumatics, industrial electricity and sensors.

MANUFACTURING TECHNOLOGY—PLASTICS DEGREE (PT)

Current industry trends indicate that the rapidly growing plastics industry will continue to expand well into the 21st century. Customers’ expectations and product design complexities are challenging today’s limited number of experienced process technicians and engineers. Many plastics companies are seeking to hire experienced production employees, but cannot find enough experienced people to meet market demand. Furthermore, few colleges worldwide offer plastics programs. This program is a cooperative venture between Nypro / Jabil, Fitchburg State University, and MWCC.

<table>
<thead>
<tr>
<th>Year 1</th>
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<tbody>
<tr>
<td><strong>Fall</strong></td>
<td><strong>Credits</strong></td>
</tr>
<tr>
<td>EET 103</td>
<td>Introduction to Industrial Electricity</td>
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<tr>
<td>MAT 162</td>
<td>Introduction to Functions Modeling (Formerly MAT 134)</td>
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<tr>
<td>PLT 105</td>
<td>Print Reading for Industry</td>
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<tr>
<td>ENG 101</td>
<td>College Writing I</td>
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| **Spring** | **Credits** |
| ENG 102 | College Writing II | 3 |
| PLT 128 | Hydraulics and Pneumatics | 4 |
| Lab Science Elective | 4 |
| Social Science Elective | 3 |

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<th>Year 2</th>
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<tr>
<td><strong>Fall</strong></td>
<td><strong>Credits</strong></td>
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<tr>
<td>AQS 110</td>
<td>Introduction Metrology</td>
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<tr>
<td>PLT 104</td>
<td>Introduction to Programmable Logic Controls</td>
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<tr>
<td>CAD 101</td>
<td>Introduction to CAD</td>
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<tr>
<td>Professional Elective I (see course list below)</td>
<td>3</td>
</tr>
<tr>
<td>Humanities Elective I</td>
<td>3</td>
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| **Spring** | **Credits** |
| PLT 101 | Introduction to Automated Mechanical Processes | 4 |
| MET 220 | Introduction to Robotics in Automation | 3 |
| Professional Elective II (see course list below) | 3 |
| Social Science Elective II | 3 |
| Humanities Elective II | 3 |

**Total Credits:** 60

1 Lab Science Electives: See Elective Courses by Abbreviation (http://catalog.mwcc.edu/associateddegreesandcertificatelistandotheroptions#electivecoursesbyabbreviationtext). The following courses are recommended:
- CHE 107 General Chemistry I
- PHY 105 College Physics I

2 Social Science Electives: See Elective Courses by Abbreviation (http://catalog.mwcc.edu/associateddegreesandcertificatelistandotheroptions#electivecoursesbyabbreviationtext)

3 Humanities Electives: See Elective Courses by Abbreviation (http://catalog.mwcc.edu/associateddegreesandcertificatelistandotheroptions#electivecoursesbyabbreviationtext)

PROFESSIONAL ELECTIVES

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<th>Credits</th>
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<tbody>
<tr>
<td>AQS 200</td>
<td>Conducting Root Cause Investigations</td>
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MANUFACTURING TECHNOLOGY

Campus
Devens Campus

Helpful hints
Information for the technical courses (PT) must be obtained from the MWCC Devens Campus at 978-630-9883.

Special requirements
Students must adhere to the 30-credit residency requirement. Technical standards must be met with or without accommodations.

Career options/Earning potential
Please click here for career options. (https://mwcc.emsicareercoach.com/#action=loadSearchResults&Search=manufacturing+technology+plastics&SearchType=occupation)

MANUFACTURING TECHNOLOGY -- MECHATRONICS CERTIFICATE (PMTC)

This program is designed to provide skills necessary to become a Manufacturing Technician employed by companies utilizing advanced automation tools. Mechatronics is an emerging field that integrates electrical and mechanical systems and incorporates computer control and information technology. The name arises from the combination of mechanics and electronics and is a product of the importance of automation and robotics in modern manufacturing processes. Students in this program will learn principles, design, and control of mechanical and electrical systems.

Year 1

Fall
PLT 105 Print Reading for Industry 3
EET 103 Introduction to Industrial Electricity 4
PLT 104 Introduction to Programmable Logic Controls 3
Professional Elective I 3

Spring
PLT 101 Introduction to Automated Mechanical Processes (Cycle 2) 4
MET 220 Introduction to Robotics in Automation 3
PLT 128 Hydraulics and Pneumatics 4
Professional Elective II 3–4

Total Credits: 27–28

Professional Elective I

Credits
BUS 105 Business Ethics 3
BUS 125 Communication For Business And Industry 3
ENG 101 College Writing I 3
PLT 220 Statistical Process Control 3
PLT 223 Production Design 3
Professional Elective II

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<tr>
<th>Course</th>
<th>Title</th>
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<tr>
<td>AQS 115</td>
<td>Quality Systems and Auditing Principles</td>
<td>3</td>
</tr>
<tr>
<td>CAD 101</td>
<td>Introduction To CAD</td>
<td>3</td>
</tr>
<tr>
<td>MAT 162</td>
<td>Introduction to Functions &amp; Modeling (Formerly MAT 134)</td>
<td>4</td>
</tr>
<tr>
<td>MGT 132</td>
<td>Principles Of Production</td>
<td>3</td>
</tr>
<tr>
<td>MGT 210</td>
<td>Principles Of Management</td>
<td>3</td>
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Campus
This program requires specialized equipment and is offered at the Devens Campus.

Helpful hints
Students should investigate the non-credit Industrial Readiness Training program as an introduction to this field. Students interested in design should take CAD 101 Introduction to CAD. For more information, call 978-630-9468.

Transfer options
This program is intended for immediate career entry. Courses completed as part of this certificate program can be applied to the Manufacturing Technology Degree. The program aligns with the nationally recognized Mechatronics Certification.

Career options/Earning potential
For career options, please click here. (https://mwcc.emsicareercoach.com/ #action=loadSearchResults&Search=mechatronics&SearchType=occupation)

Gainful Employment Program Disclosure Information
For gainful employment information, please click here. (http://mwcc.edu/gedt/pmtc)

PROGRAM STUDENT LEARNING OUTCOMES FOR PMTC AND PT

Upon graduation from this program, students shall have demonstrated the ability to:

• Communicate technical information in written and oral form.
• Participate as a contributing member of a small work team as well as the larger factory team—including problem solving.
• Solve practical production mathematical problems requiring basic skills in algebra, geometry, trigonometry, and statistics.
• Communicate in the graphic language of engineering by interpreting technical blueprints used in industry and preparing two- and three-dimensional technical sketches.
• Understand and apply the fundamentals of the basic sciences that underlie the machines used in manufacturing.
• Understand and apply the fundamentals of the many manufacturing processes used in industry to manufacture products.
• Understand and apply computer skills in the manufacturing environment.
• Understand and apply modern operations principles to manufacturing operations, including total quality management, statistical process control, and continuous quality improvement and just-in-time.
• Use a current personal computer workstation for word processing, spreadsheets, email, www searching, simple drawing and programming.

TECHNICAL STANDARDS ¹ FOR PMTC AND PT

¹ For general information about technical standards and accommodation, see Technical Standards. (http://catalog.mwcc.edu/academicresources/academicandgradingpolicies/technicalstandards)

Students entering these programs must be able to demonstrate the ability to:

• Comprehend textbook material at the 11th grade level.
• Communicate and assimilate information either in spoken, printed, signed, or computer voice format.
• Gather, analyze, and draw conclusions from data.
• Stand for two hours.
• Manipulate small parts, and make fine hand adjustments to machines and test equipment.
• Use appropriate tools found in the manufacturing environment.
• Work indoors in the presence of low, repetitious noise levels (not to exceed regulatory standards).
• Work indoors in a non-air-conditioned environment with exposure to oil vapors.
• Visualize in two and three dimensions.
• Lift 40 pounds.
• Learn to operate a computer.

PLT 101. Introduction to Automated Mechanical Processes. 4 Credits.
The course will introduce students to automated mechanical processes and mechatronics systems through hands-on laboratory experience, utilizing a mechatronics training system and its associated curriculum. Workplace safety around machinery will be emphasized, as well as creating and following standard operating procedures. Each of the components and its associated function relating to the processes will be addressed, as well as how to replace or adjust if necessary. Students using small hand tools will test, adjust, remove and replace faulty components. They will also align, connect, test and run each process station within the entire mechatronics system and evaluate its performance. Prerequisites: ENG 098, FYE 101, MAT 092, RDG 098, or placement. Spring.

PLT 104. Introduction to Programmable Logic Controls. 3 Credits.
This course covers the basics of Programmable Logic Controls (PLC), their purpose, components, function, programming and integration into mechatronics systems. Students will be introduced to the methods of creating the ladder logic in an organized fashion, and then will write programs for the controllers using RSLogix 5000. The PLCs running the programs will operate desktop training equipment, as well as various manufacturing processes within a mechatronics system in the classroom. Prerequisites: ENG 098, MAT 092, RDG 098, or placement. Fall.

PLT 105. Print Reading for Industry. 3 Credits.
This course will introduce students to the history of prints and their importance across multiple industries. The order in which information is read from a print will be stressed along with the importance of understanding each before continuing. Topics will include the language of lines and representations of 3D objects as multiple views on a 2D page, as well as a broad sweep of necessary information such as print formats, title blocks, dimensions, tolerances and an overview of GD&T (Geometric Dimensioning & Tolerancing). Additional topics will include surface finishes, revision tables, assembly drawings, spring, screw thread, and other callouts, as well as understanding information on drawings related to plastics and welded structures. Students may not receive credit for both PLT 105 and MET 105. Prerequisites: ENG 098, MAT 092, RDG 098, or placement.

PLT 128. Hydraulics and Pneumatics. 4 Credits.
The course is an introduction to the principles and applications of hydraulic and pneumatic power in manufacturing processes. Emphasis will be on safety, basic system components, operation, controls, reading circuit diagrams, and troubleshooting techniques. Students will participate in hands-on activities with pneumatic training devices and a mechatronics system. Prerequisites: ENG 098, FYE 101, MAT 092, RDG 098, or placement. Spring.

PLT 130. Introduction to Injection Molding and Extrusion of Plastics. 3 Credits.
This course introduces two primary means for processing plastics; injection molding and extrusion of polymeric materials. The course covers both the underlying engineering principles as well as their application in the processing of plastics. Students learn the different equipment and configurations used for injection molding and extrusion. Classroom lectures and eLearning content cover the basics of these processes and can be supplemented by simulated molding and extruding examples. An overview of the role of these processes in local industry is presented. Students will demonstrate proficiency in MWCC’s Institutional Student Learning Outcomes, as well as build upon communication, organizational, and interpersonal skills. Prerequisites: ENG 098, FYE 101, MAT 092, RDG 098 or placement. Spring.

PLT 220. Statistical Process Control. 3 Credits.
This course presents students with an understanding of elementary statistics by familiarizing them with basic concepts of measures of central tendency and variability, regression and correlation, probability, discrete and continuous random variables, the Central Limit Theorem, confidence intervals, and hypothesis testing. Students will learn the use of statistical methods and SPC to improve quality and productivity through measurements, control, and reduction of process variation. Topics covered include: basic statistics, the normal distribution; control charting; process capability studies; gauge and measurement analysis. Simple metrology concepts and the basics of geometric dimensioning and tolerance are also covered. Prerequisites: ENG 101 (or corequisite), MAT 162 (or corequisite).
PLT 223. Production Design. 3 Credits.
This course examines the interrelation of materials processing, product design, and function. Fundamentals of the 3D prototype in manufacturing within the industries of plastics, machining, fabrication, and/or casting will be explored. Prerequisites: ENG 101 (or corequisite), MAT 096 (or corequisite).

PLT 224. Principles of Supervision. 3 Credits.
The purpose of this course is to develop an understanding of the role and responsibilities of the production team and to strengthen values and skills related to key supervisory functions. The principles and topics addressed include production design, work simplification, inventory, quality, cost control, problem solving, decision making, leadership, management ethics, and communication. Prerequisites: ENG 101 (or co-requisite), MAT 092 (or placement).

PLT 226. Materials Design And Application. 3 Credits.
This course provides coverage of materials, design, and text methodology. Material properties, characteristics, and applications. A discussion of polymer blends and compounds using fillers, additives, and reinforcing fibers may be included. Property identification and the associated test procedures are reviewed with hands-on testing provided for the major properties. In addition, product design techniques and applications are discussed to complement the discussion of materials. Prerequisites: ENG 101 (or corequisite), MAT 162 (or corequisite).