



Plastics Manufacturing Certificate

Program Description

This program is designed to prepare students for a career in the evolving plastics manufacturing industry with hands on skills in the materials and processes, and production tools and equipment used in industry. Students will be work place ready in one year, and can apply the Plastics Manufacturing certificate credits towards the Mechanical Technology A.A.S. degree.

Admission Standards for Students

Admission into the Plastics Manufacturing certificate programs will not differ from the institution's minimum admission requirements. Students are required to provide either proof of a high school diploma, GED or documented equivalency. Placement exams (using Accuplacer) are given in Elementary Algebra (Arithmetic if they do poorly on the Algebra exam) and the areas of reading comprehension, sentence and essay skills.

Program Learning Outcomes

Program learning outcomes are statements that describe what learners will know and be able to do when they graduate from a program.

Goal 1: Professional Proficiency

Students graduating with a certificate in Plastics Manufacturing will have acquired the skills and knowledge required for a career in today's evolving manufacturing workplace. Students will understand and be able to utilize:

- Manufacturing materials and processes
- Production tools and equipment
- Fundamentals and principles of hydraulics and pneumatics
- Plastics manufacturing materials, processes and work flow methods
- Quality assurance tools and techniques

Goal 2: Critical Thinking/Problem Solving

Students graduating with a certificate in Plastics Manufacturing will demonstrate effective critical thinking and problem solving skills.

Students will effectively evaluate and resolve engineering and manufacturing issues using appropriate problem solving methodology. Students will apply their knowledge of mathematical methods and manufacturing processes and materials to meet required specifications.



Goal 3: Plastics Manufacturing Technology

Students graduating with a certificate in Plastics Manufacturing will be able to:

- Setup and operate injection molding and/or blow molding equipment.
- Select the appropriate plastic material for various applications.
- Select the appropriate manufacturing process for various applications.
- Use quality assurance tools and techniques to improve plastics manufacturing processes.
- Use spreadsheets to efficiently perform design calculations and analyze manufacturing data.

Goal 4: Communication Skills

Students graduating with a certificate in Plastics Manufacturing will demonstrate competency in oral and written communication skills.

- Students will be able to correctly interpret technical drawings and blueprints.
- Students will be able to effectively communicate technical information to appropriate audiences.

Goal 5: Professional Accountability

Students graduating with a certificate in Plastics Manufacturing will understand the appropriate professional conduct required in the workplace, enabling them to:

- Perform work safely following industry standards
- Meet deadlines
- Be punctual and maintain regular attendance
- Show respect for coworkers and customers
- Provide stewardship of resources, equipment and facilities
- Work effectively as a member of a project team



Program Curriculum Requirements

Outline all curricular requirements for the proposed program, including prerequisite, core, specialization (track, concentration), capstone, and any other relevant component requirements, including each General Education course.

Catalog Number	Course Name	Credit Hours
ENGR 103	Manufacturing Materials & Processes	3
MMT 141	Fundamentals of Plastics Technology	4
MAT102 or higher	Intermediate Algebra	3
MMT 101	Machine Tools I	3
ENGR 230	Fluid Systems Design	3
MMT 241 or MMT 242	MMT 241 Plastics Technology: Injection Molding or MMT 242 Plastics Technology: Blow Molding	4
ENGR 207	Quality Assurance	3
MMT 245	Plastics Technology Capstone	3
ENG 101	Freshman English I	3
	Technical Elective** Can be satisfied by an internship or an MMT, ENGR, or ELEC course	3



Program Curriculum Map

Catalog Number	Course Description Including Credit Hours	Program Learning Outcomes	Assessment*
ENGR 103 Manufacturing Processes & Materials 3 credits	<p>Introduces the materials and manufacturing processes with which designers, technicians and engineers must be familiar.</p> <p>Includes introduction to safety, measurement, materials, metal cutting technology, and metallurgy, and introduction to standard material removal processes including drilling, milling, lathe work, surface finishing operations, and some advanced technologies.</p> <p>Three class hours weekly.</p>	<p>Understand and be able to utilize:</p> <p>Manufacturing materials and processes.</p> <p>Effectively communicate technical information to appropriate audiences.</p>	<p>Quizzes</p> <p>Exams</p> <p>Homework assignments</p> <p>Research paper</p>
MMT 101 Machine Tools 1 3 credits	<p>This course introduces the student to a hands-on study of basic theory and laboratory experiences for lathes, milling, drilling, grinding, bench work, and bulk manufacturing operations. Study of cutting speeds and feeds, surface finishes, as well as, machine capabilities is included. An introduction to welding, materials, and welding processes will be included. Hands on skills with basic part layout, measurement, inspection, and technical drawing reading skills used by machinist will be emphasized.</p> <p>Two class hour and two lab</p>	<p>Understand and be able to utilize:</p> <p>Manufacturing materials and processes; and Production tools and equipment.</p> <p>Apply knowledge of mathematical methods and manufacturing processes and materials to meet required specifications.</p>	<p>Quizzes</p> <p>Exams</p> <p>Lab assignments</p>



	hours weekly.		
ENGR 207 Quality Assurance 3 credits	This course presents the basic concepts and practical applications of quality assurance in manufacturing. Studies the components of a measurement system and the use of common measurement equipment. An introduction to probability and statistics precedes the study of statistical process control. Covers quality concepts and quality systems, inspection of parts using engineering drawing specifications, as well as a variety of statistical techniques, including: control charts for variables, control charts for attributes, Pareto diagrams, and process capability studies. Two class hours and two lab hours weekly.	Understand and be able to utilize: Quality assurance tools and techniques. Use spreadsheets to efficiently perform design calculations and analyze manufacturing data. Create professional technical written documents. Effectively communicate technical information to appropriate audiences.	Quizzes Exams Homework assignments Lab assignments Presentations
Technology Elective 3-4 credits	May be fulfilled by ENGR, ELEC or MMT course. Students will be encouraged to take a Manufacturing Internship course.	Varies	Varies
MMT 141 Fundamentals of Plastics Technology 4 credits	Introduces students to all discipline of plastics converting (extrusion, EBM, ISBM, IM, Vacuum forming, compression molding). Covers the equipment related to each discipline (primary and auxiliary), and the materials used along with their properties and applications. Students learn about what	Understand and be able to utilize: Production tools and equipment; Plastics manufacturing materials, processes and work flow methods.	Quizzes Exams Lab assignments



	<p>drives the need for this industry and product life cycles. Visits to industry sites are part of the curriculum. Three class hours and three lab hours weekly.</p>	<p>Use quality assurance tools and techniques to improve plastics manufacturing processes.</p> <p>Apply knowledge of mathematical methods and manufacturing processes and materials to meet required specifications.</p>	
<p>MMT 241 Plastics Technology: Injection Molding 4 credits</p>	<p>Instructs students in the set ups required for the entire injection molding process. Covers the associated tooling and the design / build considerations. The purpose, function and hand-on operation of primary and auxiliary equipment is included. Material properties, process troubleshooting, automation, quality control, and workflow methodology are all covered as they relate to injection molding. Three class hour and three lab hours weekly.</p>	<p>Understand and be able to utilize:</p> <p>Production tools and equipment; Fundamentals and principles of hydraulics and pneumatics; Plastics manufacturing materials, processes and work flow methods.</p> <p>Setup and operate injection molding or blow molding equipment.</p> <p>Use quality assurance tools and techniques to improve plastics manufacturing processes.</p> <p>Apply knowledge of mathematical</p>	<p>Quizzes Exams Lab assignments</p>



		methods and manufacturing processes and materials to meet required specifications.	
MMT 242 Plastics Technology: Blow Molding 4 credits	Instructs students in the set ups required for the entire blow molding process. Covers the associated tooling and the design / build considerations. The purpose, function and hand-on operation of primary and auxiliary equipment is included. Material properties, process troubleshooting, automation, quality control, and workflow methodology are all covered as they relate to injection molding. Three class hour and three lab hours weekly.	<p>Understand and be able to utilize:</p> <p>Production tools and equipment; Fundamentals and principles of hydraulics and pneumatics; Plastics manufacturing materials, processes and work flow methods.</p> <p>Setup and operate injection molding or blow molding equipment.</p> <p>Use quality assurance tools and techniques to improve plastics manufacturing processes.</p> <p>Apply knowledge of mathematical methods and manufacturing processes and materials to meet required specifications.</p>	<p>Quizzes Exams Lab assignments</p>
MMT 245 Plastics Technology	Students will complete a semester long project focused on the manufacture of a	Understand and be able to utilize:	<p>Quizzes Exams Lab assignments</p>



<p>Capstone 3 credits</p>	<p>particular plastic part. They will identify the part requirements and appropriate material and conversion process; review costs; identify lead time/constraints; select the appropriate equipment; create operator instructions and quality assurance plans. If appropriate students will design the part using solid modelling software.</p> <p>Two class hours and two lab hours weekly.</p>	<p>Production tools and equipment; Fundamentals and principles of hydraulics and pneumatics; Plastics manufacturing materials, processes and work flow methods.</p> <p>Setup and operate injection molding or blow molding equipment.</p> <p>Select the appropriate plastic material and for various applications.</p> <p>Select the appropriate plastic manufacturing process for various applications.</p> <p>Use quality assurance tools and techniques to improve plastics manufacturing processes.</p> <p>Use spreadsheets to efficiently perform design calculations and analyze manufacturing data.</p> <p>Create professional technical written</p>	
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		documents. Effectively communicate technical information to appropriate audiences.	
ENGR 230 Fluid Systems Design 3 credits	<p>This course instructs students in the design principles and industry standards required for fluid systems. Course topics include pipe, fitting and valve specification; process equipment; pipe support and instrumentation; the fundamental principles of fluid mechanics; and hydraulic and pneumatic system equipment, principles and design.</p> <p>Two class hours / two lab hours weekly</p>	<p>Upon completion of this course a student will be able to:</p> <p>Identify the function of the key fluid system components: pipe, fittings and valves</p> <p>Understand the operating conditions of a fluid system: pressure, temperature, flow and fluid characteristics.</p> <p>Identify the type of pipe, fittings and valves appropriate for different operating conditions</p> <p>Use knowledge of fluid mechanics to select appropriate pipe and pumps.</p> <p>Interpret fluid system drawings and specifications</p>	<p>Mid Term/Final Exam</p> <p>Homework Assignments</p> <p>Design Project</p>



		<p>Interpret instrumentation specifications</p> <p>Interpret pipe specification documents</p> <p>Use ANSI standards and piping specifications to create to scale piping projections from isometric sketches</p> <p>Use ANSI standards and piping specifications to create piping & instrumentation diagrams from sketches</p> <p>Use ANSI standards and piping specifications to design and layout piping plans and elevations</p> <p>Understand the function and specifications of hydraulic and pneumatic equipment</p> <p>Use knowledge of hydraulic and pneumatic power variables to perform power and actuator</p>	
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		<p>calculations</p> <p>Use knowledge of hydraulic and pneumatic principles to understand system design and operation.</p>	
<p>ENGL 101 Freshman English I 3 credits</p>	<p>Basic composition course includes reading expository prose and short stories, writing expository themes, and practicum research techniques. Three class hours weekly.</p>	<p>Interpret analytically short nonfiction and short fiction sources by developing rhetorical abilities and tools for reading and composing.</p> <p>Select a writing process and produce writing that meets conventions of academic discourse.</p> <p>This outcome attends to—but is not limited by—audience awareness, annotation skills, topic invention and limitation, textual referencing (including MLA, APA, or other approved documentation guidelines), synthesis, analysis,</p>	<p>Writing Assignments Research Paper and Documentation Skills Final Examination</p>



		<p>argument, and Standard American English (SAE). Additionally, this includes using information literacy skills to find and evaluate books, periodicals, internet sources, and other resources.</p> <p>Reflect upon their writing identities through inquiry and critical examination of writing and persuasive purposes.</p>	
<p>MATH 102 Intermediate Algebra 3 credits</p>	<p>Prerequisite: MATH 099 or pass placement test for MATH 099. Assumes knowledge of elementary algebra. Reviews basic algebraic concepts, then progresses to rational exponents; solution of linear, rational, quadratic and radical equations; introduction of the function concept; factoring polynomials, synthetic division, and the algebra of radicals. Includes applications with word problems. Three class hours weekly</p>	<p>Students will be able to:</p> <p>Evaluate and simplify expressions using the order of operations and exponent rules.</p> <p>Perform basic operations with polynomials.</p> <p>Factor polynomial expressions.</p> <p>Solve quadratic, rational, and radical equations.</p> <p>Apply solving quadratic, rational equations to real</p>	<p>Homework Assignments Tests and/or Quizzes Comprehensive Final Exam</p>



		<p>world applications.</p> <p>Simplify and perform basic operations with rational expressions.</p> <p>Simplify and perform basic operations with radicals.</p> <p>Simplify and perform basic operations with complex numbers.</p> <p>Sketch the graph of quadratic equations using the 5-point approach.</p> <p>Solve and graph quadratic and rational inequalities.</p>	
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*Assessments include but are not limited to quizzes, exams, homework assignments, research papers, etc.

Sample Program Schedule and Curriculum

Complete the **SUNY Program Schedule for Certificate and Advanced Certificate Programs** to show how a typical student may progress through the program.

NOTE: For an undergraduate certificate program, the **SUNY Sample Program Schedule for Certificate and Advanced Certificate Programs** must show **all curricular requirements and the number of terms required to complete them**. Certificate programs **are not required** to conform to SUNY's and SED's policies on credit limits, general education, transfer and liberal arts and sciences.



EXAMPLE FOR ONE TERM: Sample Program Schedule for Certificate Program

Term 2: Fall 2015			
Course Number & Title	Cr	New	Prerequisite(s)
Manufacturing Materials & Processes ENGR 103	3		
Machine Tools 1 MMT 101	3		
Fundamentals of Plastics Technology MMT141	4	X	
English 101 Freshman English I	3		
Fluid Systems Design ENGR 230	3		
Term Credit Total:	16		



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