Computerized Machining Technology

Faculty
Coordinator/Master Instructor
Clay
Advanced Instructor
Moore
Instructor
McCammon
(1 to 2 Years)

One Basic Technical Certificate, two Advanced Technical Certificates, one Associate of Applied Science degree, and one Bachelor of Applied Science degree are available.

Objectives

Students will:

- develop entry-level skills in the operation of manual lathes and milling machines; and
- develop entry-level skills in CNC (Computerized Numerical Control) machine programming and operation.

The program is accredited by the Association of Technology, Management, and Applied Engineering.

For a Program Information Packet showing descriptions of each option, course descriptions, lists of course sequences, and the cost of books, tools, uniforms, fees, and other expenses, go online to http://www.isu.edu/ctech/computerized_machining/.

This program requires students to achieve certain grades in order to advance each semester. Specific information is available in the program’s student handbook. If a student fails math, then s/he must repeat the course and obtain a passing grade before advancing to the next math class. If the student fails the same math class a second time, then s/he must exit the program and make up the deficiency through Technical General Education or other appropriate methods. The student will then be allowed to repeat the course at the next available program opening.

Based on keyboarding skills, students may be required to take a 1 credit keyboarding class in order to meet the competencies of the program.

Basic Technical Certificate: CNC Programmer
(1 Year)

Requires machining experience; a student needs instructor permission to enroll in this option.

Required Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACH 0261</td>
<td>CNC Introduction to Theory</td>
<td>2</td>
</tr>
<tr>
<td>MACH 0265</td>
<td>Introduction to CNC Machine Practice</td>
<td>4</td>
</tr>
<tr>
<td>MACH 0270</td>
<td>CNC Machining Practice I</td>
<td>4</td>
</tr>
<tr>
<td>MACH 0271</td>
<td>CNC Programming Theory I</td>
<td>2</td>
</tr>
<tr>
<td>MACH 0272</td>
<td>CNC Math I</td>
<td>3</td>
</tr>
<tr>
<td>MACH 0281</td>
<td>CNC Programming Theory II</td>
<td>2</td>
</tr>
</tbody>
</table>

Total Hours 20

Advanced Technical Certificate: CNC Operator
(2 Years)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>MACH 0110</td>
<td>Machine Tool Lab I</td>
<td>3</td>
</tr>
<tr>
<td>MACH 0111</td>
<td>Machine Tool Theory I</td>
<td>2</td>
</tr>
<tr>
<td>MACH 0112</td>
<td>Machine Math I</td>
<td>3</td>
</tr>
<tr>
<td>MACH 0120</td>
<td>Machine Tool Lab II</td>
<td>3</td>
</tr>
<tr>
<td>MACH 0121</td>
<td>Machine Tool Theory II</td>
<td>2</td>
</tr>
<tr>
<td>MACH 0123</td>
<td>Blueprint Reading</td>
<td>2</td>
</tr>
<tr>
<td>MACH 0130</td>
<td>Engine Lathe Practice II</td>
<td>4</td>
</tr>
<tr>
<td>MACH 0136</td>
<td>Applied Machining Geometry and Trigonometry</td>
<td>3</td>
</tr>
<tr>
<td>MACH 0140</td>
<td>Milling Practice II</td>
<td>5</td>
</tr>
<tr>
<td>MACH 0230</td>
<td>CNC Mill Operations</td>
<td>8</td>
</tr>
<tr>
<td>MACH 0240</td>
<td>CNC Lathe Operations</td>
<td>8</td>
</tr>
<tr>
<td>MACH 0250</td>
<td>Advanced Machine Practice I</td>
<td>4</td>
</tr>
<tr>
<td>MACH 0261</td>
<td>CNC Introduction to Theory</td>
<td>2</td>
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<tr>
<td>MACH 0265</td>
<td>Introduction to CNC Machine Practice</td>
<td>4</td>
</tr>
<tr>
<td>TGE 0158</td>
<td>Employment Strategies</td>
<td>2</td>
</tr>
<tr>
<td>COMM 1101</td>
<td>Principles of Speech ¹</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition ¹</td>
<td>3</td>
</tr>
<tr>
<td>or ENGL 1101P</td>
<td>English Composition Plus</td>
<td></td>
</tr>
</tbody>
</table>

Total Hours 61

¹ Contributes to a General Education requirement.

Advanced Technical Certificate: Machining Technology
(2 Years)

Required Courses:

The following required courses must be completed with a 2.0 GPA:

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<td>Milling Practice II</td>
<td>5</td>
</tr>
<tr>
<td>MACH 0220</td>
<td>CAD and CAM I Applications</td>
<td>3</td>
</tr>
<tr>
<td>MACH 0221</td>
<td>CAD and CAM I Theory</td>
<td>3</td>
</tr>
<tr>
<td>MACH 0225</td>
<td>Interpreting Technical Data</td>
<td>1</td>
</tr>
</tbody>
</table>
The following required courses must be completed with a 2.0 GPA:

Required Courses:

1. MACH 0250 Advanced Machine Practice I - 4 semester hours
2. MACH 0261 CNC Introduction to Theory - 2 semester hours
3. MACH 0265 Introduction to CNC Machine Practice - 4 semester hours
4. MACH 0270 CNC Machining Practice I - 4 semester hours
5. MACH 0271 CNC Programming Theory I - 2 semester hours
6. MACH 0272 CNC Math I - 3 semester hours
7. MACH 0275 CAD and CAM II - 2 semester hours
8. MACH 0281 CNC Programming Theory II - 2 semester hours
9. MACH 0290 CNC Machining Practice II - 3 semester hours
10. TGE 0158 Employment Strategies - 2 semester hours
11. COMM 1101 Principles of Speech - 3 semester hours
12. ENGL 1101 English Composition - 3 semester hours
   or ENGL 1101P English Composition Plus - 3 semester hours

Total Hours: 68

1. Associates of Applied Science Degree: Computerized Machining Technology
(2 Years)

Required Courses:

The following required courses must be completed with a 2.0 GPA:

1. MACH 0110 Machine Tool Lab I - 3 semester hours
2. MACH 0111 Machine Tool Theory I - 2 semester hours
3. MACH 0112 Machine Math I - 3 semester hours
4. MACH 0120 Machine Tool Lab II - 2 semester hours
5. MACH 0121 Machine Tool Theory II - 2 semester hours
6. MACH 0123 Blueprint Reading - 2 semester hours
7. MACH 0130 Engine Lathe Practice II - 4 semester hours
8. MACH 0136 Applied Machining Geometry and Trigonometry - 3 semester hours
9. MACH 0140 Milling Practice II - 5 semester hours
10. MACH 0220 CAD and CAM I Applications - 3 semester hours
11. MACH 0221 CAD and CAM I Theory - 3 semester hours
12. MACH 0225 Interpreting Technical Data - 1 semester hours
13. MACH 0250 Advanced Machine Practice I - 4 semester hours
14. MACH 0261 CNC Introduction to Theory - 2 semester hours
15. MACH 0265 Introduction to CNC Machine Practice - 4 semester hours
16. MACH 0270 CNC Machining Practice I - 4 semester hours
17. MACH 0271 CNC Programming Theory I - 2 semester hours
18. MACH 0272 CNC Math I - 3 semester hours
19. MACH 0275 CAD and CAM II - 2 semester hours
20. MACH 0281 CNC Programming Theory II - 2 semester hours
21. MACH 0290 CNC Machining Practice II - 3 semester hours
22. TGE 0158 Employment Strategies - 2 semester hours

General Education courses:

1. COMM 1101 Principles of Speech - 3 semester hours
2. One four-credit physical science course that includes a lab and partially satisfies General Education Objective 5

Total Hours: 78

1. See General Education Requirements (minimum 15 credits) for A.A.S. Degree at the start of the College of Technology section of the catalog.
2. Contributes to a General Education requirement.

Courses:

MACH 0110 Machine Tool Lab I: 3 semester hours.
Machine Tool Lab I introduces students to the engine lathe and gives them practice on basic setup, safety, operation and maintenance of the machine. It prepares students for operations utilized in the advanced lathe practice labs. Related skills include supporting equipment. COREQ: MACH 0111. F, S

MACH 0111 Machine Tool Theory I: 2 semester hours.
Machine Tool Theory is a study of conventional lathe operations including facing, turning, boring, grooving, knurling, and thread and taper cutting. Related skills include supporting equipment. COREQ: MACH 0110. F, S

MACH 0112 Machine Math I: 3 semester hours.
Basic math principles of fractional and decimal numbers as related to machine shop measuring, blueprint reading, taper turning, threading and cutting speeds and feeds. Course covers basic algebra. F, S

MACH 0120 Machine Tool Lab II: 3 semester hours.
Machine Tool Lab II introduces the student to safety practices, maintenance, and operation of milling machines. In addition, students will receive instruction and practice on supporting equipment. Emphasis is on setup, safety, maintenance, and manipulation of all controls. COREQ: MACH 0121. F, S

MACH 0121 Machine Tool Theory II: 2 semester hours.
Machine Tool Theory II is a study of the various milling machine operations. These include milling machines and the devices that attach to these mills for various operations. Also included is the operation of support equipment. COREQ: MACH 0120. F, S

MACH 0123 Blueprint Reading: 2 semester hours.
Interpreting Blueprints in an introduction to identifying blueprint information needed to produce a machined part, through the interpretation of lines, symbols, and numbers as shown on two and three view orthographic drawings. During the discussion of tolerances, Geometric Dimensioning and Tolerancing will be introduced. F, S

MACH 0130 Engine Lathe Practice II: 4 semester hours.
A continuation of MACH 0110 machining more advanced lathe projects. PREREQ: MACH 0110. F, S

MACH 0136 Applied Machining Geometry and Trigonometry: 3 semester hours.
More advanced math course using geometry and trigonometry required when solving threading, tapering, chords, arcs, areas, and milling speed/feed problems in a machine shop environment. PREREQ: MACH 0110. F, S

MACH 0140 Milling Practice II: 5 semester hours.
A continuation of MACH 0120 on horizontal and vertical milling machines, performed to closer tolerances and time limits. Also includes grinding, layout and drilling operations as scheduling permits. PREREQ: MACH 0120 F, S

MACH 0220 CAD and CAM I Applications: 3 semester hours.
A hands-on lab utilizing computers for programming CNC machining centers for production purposes. COREQ: MACH 0221. F, S

MACH 0221 CAD and CAM I Theory: 3 semester hours.
Introductory theory course in the utilization of CAD/CAM systems. COREQ: MACH 0220. F, S
MACH 0225 Interpreting Technical Data: 1 semester hour.
Study of tables, charts, formulas, thread calculations, and related information as required of a machinist working in industry. Su

MACH 0230 CNC Mill Operations: 8 semester hours.
Set-up and operation of computer numerically controlled (CNC) vertical milling centers. Build jigs, set tooling, and use pre-written programs to produce CNC parts. PREREQ: MACH 0261. D

MACH 0240 CNC Lathe Operations: 8 semester hours.
Set-up and operation of computer numerically controlled lathes. Set the tooling and use pre-written programs to produce CNC parts. PREREQ: MACH 0261. D

MACH 0250 Advanced Machine Practice I: 4 semester hours.
Advanced machining practices on engine lathes, grinders, drill inspection, and metal layout. PREREQ: MACH 0140. F, S

MACH 0261 CNC Introduction to Theory: 2 semester hours.
An introductory course in basic programming of computer controlled machine tools. Emphasis is theory only. COREQ: MACH 0265. F, S

MACH 0265 Introduction to CNC Machine Practice: 4 semester hours.
A hands-on introductory course in the operation of Computer Numerical Control (CNC) vertical milling centers. Includes the safety practices, maintenance, setup and operation of CNC Mills. COREQ: MACH 0261. F, S

MACH 0270 CNC Machining Practice I: 4 semester hours.
An introductory course in basic computer skills, programming, set-up and operations of computer numerically controlled machine tools. PREREQ: Recommendation of program coordinator. COREQ: MACH 0271. F, S

MACH 0271 CNC Programming Theory I: 2 semester hours.
This course prepares the student in the programming of computer numerically controlled machine tools. Includes computer application of absolute/incremental, EIA/ISO, and conversational address systems. PREREQ: Program coordinator recommendation based upon demonstrated proficiency on conventional machine tools. COREQ: MACH 0270. F, S

MACH 0272 CNC Math I: 3 semester hours.
An advanced math course covering the basic use of geometric/trigonometric principles for identifying and solving all types of machine shop triangulation problems for the purpose of manufacturing parts on conventional and CNC machines. PREREQ: MACH 0136. F, S

MACH 0275 CAD and CAM II: 2 semester hours.
Programming CNC machines utilizing CAD/CAM systems. Course familiarizes the student with applications, theory, and operation of CAD/CAM. PREREQ: MACH 0220 and MACH 0221. F, S

MACH 0281 CNC Programming Theory II: 2 semester hours.
An advanced course in the programming, set-up and operations of computer numerically controlled machine tools and accessory devices. MACH 0281 is a continuation of MACH 0271. COREQ: MACH 0290. PREREQ: MACH 0271. F, S

MACH 0290 CNC Machining Practice II: 3 semester hours.
An advanced course in the programming, set-up and operations of the computer numerically controlled machine tools. MACH 0290 is an advanced continuation of MACH 0270. COREQ: MACH 0281. PREREQ: MACH 0270. F, S

MACH 0296 Independent Study: 1-8 semester hours.
Addresses specific learning needs of individuals for the enhancement of knowledge and skills within the program area under the guidance of an instructor. May be repeated. Graded S/U, or may be letter-graded. PREREQ: Permission of the instructor. D

MACH 0298 Special Topics: 1-8 semester hours.
Addresses the specific needs of industry, enabling students to upgrade technical skills that are not included in the current program curriculum. May be repeated. Graded S/U, or may be letter-graded. PREREQ: Permission of instructor. D