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**CNC Machine Operator/Programmer Program**

**Course Curriculum**

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| **Semester 01**   (Tuition: $2,720  Books: TBD) |
| **Course #** | **Course Title** | **Credits** |
| 10-105-110 | Computer Applications | 1 |
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| Credits: 1 Lecture Hours: 0 Lab Hours: 36Students are introduced to the hardware and software components of modern computer systems and the application of computers in the home, business, and industry. Time will be devoted to hands-on activities using general purpose software packages available today (file management, word processing, spreadsheet, Internet and electronic mail). Online Option Available |
| 31-420-320 | Intro to Print Reading | 1 |
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| Credits: 1 Lecture Hours: 36Introduction to reading and interpreting prints and industrial drawings. Interpretation of views, projection, lines, section, working and assembly drawings relative to manufacturing processes and order of operations. This course integrates math skills with print reading. |
| 31-420-321 | Machine Shop Safety Practices & Maintenance | 1 |
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| Credits: 1 Lecture Hours: 27 Lab Hours: 9The safety unit includes instruction in topics such as lockout-tagout, personal protective equipment, OSHA compliance, material safety data sheets, handling and storage of materials and emergency response procedures. OSHA 10-hour General Industry Outreach Training, forklift training, and hoisting and rigging. |
| 31-420-322 | Intro to Manual Mill | 1 |
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| Credits: 1 Lecture Hours: 9 Lab Hours: 27This course will provide instruction and practice in the use of milling machines and various processes performed on them. Students will learn about mills, associated processes, milling machine tooling, and related safety/maintenance issues. |
| 31-420-323 | Intro to Manual Lathe | 1 |
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| Credits: 1 Lecture Hours: 9 Lab Hours: 27This course will provide instruction and practice in the use of lathe machines and various processes performed on them. Students will learn about lathe, associated processes, lathe machine tooling, and related safety/maintenance issues. |
| 31-420-324 | Manual Machine Speeds & Feeds | 1 |
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| Credits: 1 Lecture Hours: 18 Lab Hours: 18Students will determine cutting speeds for high speed steel tooling on manual mill and lathes. Students will calculate feed per tooth and inches per minute for various cutters. Students will calculate proper spindle speeds for twist drills. |
| 31-420-325 | Tooling & Materials of Manufacturing | 1 |
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| Credits: 1 Lecture Hours: 18 Lab Hours: 18Students will learn about of various types of tooling used in the industry. Students will learn about the materials they are machining and how the materials are processed. |
| 31-420-326 | Intro to Quality Practices & Measurement Equipment | 1 |
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| Credits: 1 Lecture Hours: 18 Lab Hours: 18Students will perform quality practices used by machine shops for various part checks. Students will learn how to fill out data sheets and use various parts specific measurement equipment. |
| 31-420-327 | Intro to Surface Grinding | 1 |
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| Credits: 1 Lecture Hours: 9 Lab Hours: 27Students complete basic grinding operations to include installation of grinding wheel, work holding techniques, speeds and feeds and problem solving. Use profilometer to measure roughness average and grind parts specific dimensions. |
| 31-420-328 | Intro to Mastercam Mill 2D | 1 |
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| Credits: 1 Lecture Hours: 36Introduction to computer aided machining of 2 dimension parts using CAM software. Students will use CAM software to create and machine pockets, slots, bosses, holes and engraved details in CNC milled parts. |
| 31-420-329 | Advanced Manual Mill | 1 |
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| Credits: 1 Lecture Hours: 9 Lab Hours: 27This course will be a continuation of Intro to Manual Mill. Students will practice in the use of milling machines and various processes performed on them. Students will learn about rotary tables, t-slot cutters and boring bars. Co-requisite: Intro to Manual Mill (31-420-322) |
| 31-420-330 | Advanced Manual Lathe Machine | 1 |
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| Credits: 1 Lecture Hours: 9 Lab Hours: 27This course is a continuation of Intro to Manual Lathe Machine. Students will practice the use of lathe machines and various processes performed on them. Students will learn about lathe, four jaw chucks, face plates, taper attachments and collet puller. Co-requisite: Intro to Manual Lathe (31-420-323) |
| 31-801-310 | Workplace Communication | 2 |
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| Credits: 2 Lecture Hours: 36 Lab Hours: 18Students apply oral, written, listening, and non-verbal skills to workplace situations. Students discover how to use communication as the key to solving workplace problems, resolving conflicts, working as members of a team, and effectively giving and receiving criticism. Students develop an understanding of diversity in the workplace, harassment issues, and the impact of substance abuse on the job. Prerequisites: Communication 1 (73-851-710), or An undeclared major student. |
| 31-804-305 | Applied Mathematics | 2 |
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| Credits: 2 Lecture Hours: 54Students compute with rational numbers. They make and convert various measurements. Students use formulas to solve problems. They compute dimensions of geometric shapes. Students use statistical tools to represent and analyze data. They analyze various financial situations. Students use basic right triangle trigonometry to solve problems. In each topic area, students solve application problems. |
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| **Semester 02**   (Tuition: $2,860  Books: TBD) |
| **Course #** | **Course Title** | **Credits** |
| 31-420-331 | Advanced Print Reading | 1 |
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| Credits: 1 Lecture Hours: 18 Lab Hours: 18Print reading is learning a new language in graphic or symbolic form for the purpose of manufacturing or assembling mechanical components. Units include: orthographic projection, sketching, dimensioning, machine process callout, tolerance, finish, title blocks, notes, hole types, threads, symbols and callouts. Prerequisite: Intro to Print Reading (31-420-320) |
| 31-420-332 | Advanced Measuring Equipment | 1 |
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| Credits: 1 Lecture Hours: 18 Lab Hours: 18Provides instruction in the care and use of measurement tools and inspection equipment necessary to maintain quality standards in the manufacturing environment. Semi-precision through high-precision measurement tools, gages, inspection sheets and processes, direct and comparative inspection methods will be covered. Prerequisite: Intro Quality Practices & Measurement Equipment (31-420-326) |
| 31-420-333 | Intro to Mastercam Lathe | 1 |
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| Credits: 1 Lecture Hours: 36Introduction to computer aided machining of 2 dimension parts using CAM software. Students will use CAM software to create lengths, diameters, champer, counterbore, external threads and parting off in CNC lathes. |
| 31-420-334 | Intro to Computer Numerical Control Prog Mill | 1 |
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| Credits: 1 Lecture Hours: 18 Lab Hours: 18Students apply skills in the programming and operation of a machining center using G-code. Explore basic metrology, tool selection and work hold devices. Rapid and Linear Interpolation, Circular Interpolation, Drilling, Bolt Circles, Subroutines and Subprograms, Cutter Compensation and Pocket Milling. |
| 31-420-335 | Intro to Computer Numerical Control Prog Lathe | 1 |
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| Credits: 1 Lecture Hours: 18 Lab Hours: 18An introduction to planning and writing programs for computer numerically controlled turning centers using G and M code. Students learn to write basic programs for CNC lathes, proof programs and run programs in CNC machine tools. Programming basics will include multiple tool programs, tool nose compensation and canned cycles. |
| 31-420-336 | Basic CNC Operation Mill | 1 |
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| Credits: 1 Lecture Hours: 9 Lab Hours: 27The setup of CNC Machining centers is covered in this course. Applications include selection of tools and workholding devices, setting tool offsets and work coordinate positions, calling programs, proofing programs, and minor edits and machine adjustments. Co-requisite: Intro to Computer Numerical Control Prog Mill (31-420-334) |
| 31-420-337 | Basic CNC Operation Lathe | 1 |
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| Credits: 1 Lecture Hours: 9 Lab Hours: 27The setup of CNC turning centers is covered in this course. Applications include selection of tools and workholding devices, setting tool offsets and work coordinate positions, calling programs, proofing programs, and minor edits and machine adjustments. Co-requisite: Intro to Computer Numerical Control Prog Lathe (31-420-335) |
| 31-420-338 | Intro to CMM | 1 |
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| Credits: 1 Lecture Hours: 9 Lab Hours: 27Students will clean a CMM to a white glove, paper test, calibrate, and setup a workspace. Students will follow prewritten CMM program to obtain part dimensions. Co-requisite: Basic CNC Operation Mill (31-420-336) |
| 31-420-339 | Advanced CMM | 1 |
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| Credits: 1 Lecture Hours: 9 Lab Hours: 27Students will develop part specific programs to verify parts that have been produced in lab. Students will apply GD&T to verify parts are within critical dimensions. Co-requisite: Intro to CMM (31-420-338) |
| 31-420-340 | Geometric Dimensioning & Tolerance | 1 |
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| Credits: 1 Lecture Hours: 27 Lab Hours: 9Recognition and interpretation of geometric dimensioning and tolerancing symbols and application as applied to prints for the manufacture of parts. Co-requisite: Advanced Measuring Equipment (31-420-332) |
| 31-420-341 | Fixture Basic Lathe & Mill | 1 |
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| Credits: 1 Lecture Hours: 9 Lab Hours: 27The fundamentals of workholding and fixturing for CNC turning and milling are covered in this course. Students will apply what they learn by determining workholding needs, recognizing problems with CNC machine operation, change and adjust tooling and fixtures and perform multiple part setups. Co-requisite: Basic CNC Operation Lathe (31-420-337) and Basic CNC Operation Mill (31-420-336) |
| 31-420-342 | CNC Machine Speeds & Feeds | 1 |
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| Credits: 1 Lecture Hours: 18 Lab Hours: 18Students will determine cutting speeds for carbide tooling on mill and lathes. Students will calculate feed per tooth and inches per minute for various cutters and materials. Students will calculate proper spindle speeds for milling and drilling operations. Prerequisite: Manual Machine Speeds & Feeds (31-420-324) |
| 31-420-343 | Processes of Manufacturing | 1 |
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| Credits: 1 Lecture Hours: 18 Lab Hours: 18Students learn to apply manufacturing requirements to the design of mechanisms by studying manufacturing disciplines. These disciplines include metallurgy, steel identification, casting, forging, cold working metals, plastics, and other specialized processes. The students will receive hands on work with MIG welding. Tours of various area manufacturing facilities will give the students new insight into various manufacturing processes. Co-requisite: Basic CNC Operation Lathe (31-420-337) and Basic CNC Operation Mill (31-420-336) |
| 31-420-344 | Advanced Mastercam Mill & Lathe | 1 |
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| Credits: 1 Lecture Hours: 18 Lab Hours: 18This will be a continuation of Mastercam Mill & Lathe 2D where students will draw within software multiple mill and lathe parts. Then post to CNC machines to finish parts. Prerequisite: Intro to Mastercam Mill 2D (31-420-328) Co-requisite: Intro to Mastercam Lathe (31-420-333) |
| 31-420-345 | Precision Machining Internship | 2 |
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| Credits: 2 Lecture Hours: 0 Occupational Hours: 144Students apply technical theory and skills on the job. Students will setup and perform production part runs. Students will verify critical dimensions on parts and develop appropriate employment attitudes. |
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| **Total Credits: 32** |
| **Estimated Total Tuition: $5,580** |
| **Tools/Equipment: $300** |