



QUINSIGAMOND
Community College

MNT 108: Basic Machine Operation – Course Description, Topics, and Learning Objectives

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2012-2013
QUINSIGAMOND COMMUNITY COLLEGE
NEW COURSE PROPOSAL

| | |
|---|----------------------------------|
| Course Discipline/Division: Manufacturing Technology | |
| Course Number: MNT 108 | |
| Course Name: Basic Machine Operation | |
| Prerequisites and/or corequisites (confer with affected department coordinator): None | |
| CIP code (check with IRaP Office) 48.0503 | |
| Effective Term/year: FALL 2013 | |
| Give a rationale for the new course. Be sure to indicate whether this course replaces another course. The proposed new course provides education and training for basic machine operation. It supports the fundamentals of manufacturing in a hands-on manner and supplies students with essential skills in a manufacturing environment. The course will offer individuals without these skills the opportunity to gain these competences, and supports an accelerated degree for individuals that have already mastered the basics, such as vocational school students. This course is designed to support articulation with vocational high schools. This represents curriculum design that supports national and state wide skills standards from MSSC-CPT (Manufacturing Skill Standards Council- Certified Production Technician) and MACWIC (Massachusetts Career Workforce Innovation Collaborative – Applied Manufacturing Technology Certification). | |
| Is the course content similar to other courses now offered? Yes ___ No <u>X</u> If yes, attach a statement for the coordinator of the department offering the similar course. | |
| Please indicate if this course will serve as any of the following types of electives ___ Elective ___ Discipline specific <u>X</u> Program specific Manufacturing Technology Certificate ___ Multiple perspective (confer with the Liberal Arts Coordinator) | |
| Is this course required for a program? If yes, submit a separate Program Revision Proposal or New Program Proposal. Yes | |
| Expected enrollment per term: 15 | Expected enrollment per year: 15 |
| Will any of the following be required: Additional staff <u>Y</u> Additional space <u>Y</u> Additional equipment <u>Y</u> Provide a rationale for any needs indicated above and include approximate cost of equipment. Additional space will be required through a collaboration between QCC and one of our local vocational schools, WPI, or MassMEP. | |
| Library print and non-print resources in support of this course: \$500 | |

Course Materials

| Course number: MNT 108 | | | | | | | | |
|--|--------------|---|------|---------|--------|---|--------------|---|
| Course name: Basic Machine Operation | | | | | | | | |
| Credits: 3 | | | | | | | | |
| Lecture Hours: 45 | Lab hours: 0 | Clinic Hours: 0 | | | | | | |
| <p>General course description and prerequisites (as it will appear in the catalog):</p> <p>MNT 108 Basic Machine Operation 3 cr</p> <p>This course introduces some of the fundamentals of machine tool technologies. It is focused on hands-on activities that are essential to a successful career in a manufacturing industry. Students learn from highly qualified instructors how to use bench working practices as well as operate lathes and milling machines. A variety of assignments challenge students to produce high precision parts while learning mechanical inspection techniques. Finally, students are introduced to the fundamentals of CNC programming and CNC equipment.</p> <p>S</p> | | | | | | | | |
| <p>All required texts and paperbacks, including information on publisher and edition used (provide a suggested text):</p> <p>None</p> | | | | | | | | |
| <p>Instructional Objectives (list):</p> <ol style="list-style-type: none"> 1. Introduce to concepts of machine tool operation and safety 2. Introduce basic blue prints reading skills 3. Demonstrate use of a variety of mechanical inspection equipment 4. Demonstrate bench working practices 5. Demonstrate precision turning operations 6. Demonstrate precision milling operations 7. Identify production planning basics 8. Demonstrate CNC fundamentals | | | | | | | | |
| <p>Teaching procedures: (provide suggested teaching methodology):</p> <p>The course blends a series of lectures, demonstrations, and hands on activities to promote learning in this fundamental course for manufacturing technologists. This course focuses on the understanding and use of basic machine tools. Students use math skills to identify requirements and qualify products. The instructor demonstrates how to use all the tools prior to student assignment; then observes and evaluates student competence in use of each tool and adjusts students accordingly.</p> | | | | | | | | |
| <p>Course topics and/or assignments and/or required and/or supplemental reading (provide a list of suggested course topics):</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">WEEK</th> <th style="text-align: left;">SUBJECT</th> <th style="text-align: left;">TOPICS</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>Introduction</td> <td>Syllabus Health and Safety Practices in a machine shop environment</td> </tr> </tbody> </table> | | | WEEK | SUBJECT | TOPICS | 1 | Introduction | Syllabus Health and Safety Practices in a machine shop environment |
| WEEK | SUBJECT | TOPICS | | | | | | |
| 1 | Introduction | Syllabus Health and Safety Practices in a machine shop environment | | | | | | |

| | | |
|----|-------------------|---|
| | | Machine tool safety |
| 2 | Bench working | Layout flat and/or round stock Cut metal using hacksaw File and blend angles and radii on work piece Mark work piece with identification information Operate a power saw |
| 3 | Bench working | Read and interpret basic blueprints Create a basic drawing using proper dimensioning and annotation Determine and select material, size, and amount needed to complete product. Mechanical inspection equipment |
| 4 | General Machining | Drill a hole to blueprint specification and within a tolerance Countersink a hole to blueprint specification and within a tolerance Ream a hole to blueprint specification and within a tolerance Tap a hole to blueprint specification and within a tolerance Counterbore a hole to blueprint specification and within a tolerance |
| 5 | Precision Turning | Identify and setup proper workholding devices to include universal and independent chucks and collets Outside diameter turning |
| 6 | Precision Turning | Inside diameter turning Single point threading |
| 7 | Precision Turning | Parting off Knurling |
| 8 | Precision Milling | Machining a form Indicate vice Tram miller head Using edge finder |
| 9 | Precision Milling | locate and indicate holes and pins Mill flat surface |
| 10 | Precision Milling | Milling angles Square up a workpiece Climb milling v's conventional milling |
| 11 | Precision Milling | Mill shoulder, slots and pockets Boring a hole |
| 12 | Intro to CNC | Using a simple CNC controller Start up and shut down Set up datum point and tool geometry offsets Absolute positioning Incremental positioning |
| 13 | Intro to CNC | Straight line milling |

| | | |
|---|--------------|--|
| 14 | Intro to CNC | Clockwise interpolation Counter clockwise interpolation Pockets Holes, tapped holes, and counter sink holes |
| 15 | Intro to CNC | Arrays Cutter compensation Dry run, edit, and execute |
| Other information: | | |
| <ul style="list-style-type: none"> Suggested basis for student grading and criteria for evaluating student performance <ol style="list-style-type: none"> Exams & quiz (50%) Class participation (15%) Attendance (15%) Project (20%) Suggested attendance policy <p>All students are expected to attend every session. Students are responsible for all that transpires in class whether or not they are in attendance. Excessive absences or lateness may lead to a failing grade or removal from the class roster. Students must notify the instructor of any anticipated absences. Any student who misses a test date without prior approval will be penalized 10 points from their exam score for each class until a makeup exam is taken.</p> <ul style="list-style-type: none"> Suggested assessment methodologies <p>Using both formative and summative assessment through exams, quizzes, student projects and class discussions as described above.</p> | | |
| Please submit a syllabus for this new course to your dean. | | |

List the Student Learning Outcomes for this course in the table below. Recommendations for writing SLOs can be found in the *General Information for Academic Affairs Proposals* document that is available on the QCC's Intranet under Frequently Used Forms (Academic Governance Forms).

| COURSE STUDENT LEARNING OUTCOMES FOR MNT 108 BASIC MACHINE OPERATION | |
|--|--|
| Upon completion of the course, students will be able to: | |
| 1 | Use safe working practices in a machine shop environment. |
| 2 | Apply basic shop math skills to analyze engineering component drawings. |
| 3 | Select appropriate materials and tooling for a variety of demands. |
| 4 | Use good bench working practices to mark up and manufacture parts. |
| 5 | Use standards inspection equipment to analyze component conformance. |
| 6 | Set up and operate drill presses, vertical milling machines, and lathes. |
| 7 | Understand the principles of CNC machines |

How does the course support general education? Using the chart below, indicate the degree or level of connection between the course and outcome as indicated here.

I – Introductory/Background – There is an indirect relationship between the course and the outcome. The outcome itself is not the focus of the course but at least one element of the course serves as a building block to the achievement of the final outcome. For example, course elements may provide the knowledge, skills or attitudes necessary for the ultimate achievement of the outcome.

M – Intermediate/Transitional - There is more of a direct relationship between the course and the outcome than Introductory. A mixture of course elements supports the final achievement of the outcome, but the final integration of knowledge, skills and attitudes necessary for its achievement is not accomplished in this course. For example, knowledge, skills and/or attitudes (at least 2 of the 3) required for achievement of the outcome may be the focus of the course or course element, but the integration of all three is not.

E – Emphasized – There is a direct relationship between the course and the outcome. At least one element of the course focuses specifically on the complex integration of knowledge, skills and attitudes necessary to perform the outcome.

| CONNECTION OF MNT 108 BASIC MACHINE OPERATION TO GENERAL EDUCATION STUDENT LEARNING OUTCOMES | I,M,E |
|--|-------|
| Communication Skills: Students will write and speak effectively. | I |
| Information Literacy: Students will locate, evaluate and apply reliable and appropriate information. | M |
| Quantitative Reasoning: Students will apply the concepts and methods of mathematics to solve problems. | M |
| Scientific Reasoning: Students will relate scientific methods of inquiry to the acquisition of knowledge. | I |
| Technical Literacy: Students will utilize computer and emerging technologies effectively. | I |
| Aesthetics: Students will appreciate the variety of human experiences as expressed through the arts. | N/A |
| Multiple Perspectives: Students will demonstrate knowledge and appreciation of diverse cultures. | N/A |
| Ethics: Students will develop an awareness of personal obligations and responsibilities in one's community of influence. | N/A |
| Impact of Technology: Students will reflect on the impact of scientific and technological advances on the individual, society and the environment. | M |
| Civic Literacy: Students will demonstrate awareness of the responsibilities of local, national and international citizenship. | N/A |

If the course is required in a program or it is an elective in a program, please indicate how the course contributes to the Program Student Learning Outcomes. List the Program Student Learning Outcomes and indicate the degree or level of connection between the course and outcome as I, M, or E. Please delete this table if it is not applicable.

| CONNECTION OF MNT 108 BASIC MACHINE OPERATION to PROGRAM STUDENT LEARNING OUTCOMES FOR MANUFACTURING TECHNOLOGY | | |
|---|--|---|
| 1 | Ability to use the contemporary techniques, skills, and tools necessary for effective manufacturing systems practice. | I |
| 2 | Understand the behavior and properties of materials as they are altered and influenced by processing in manufacturing. | M |
| 3 | Understand the design of products, and the equipment, tooling and environment necessary for their manufacture | M |
| 4 | Ability to apply advanced methods to the analysis, synthesis, and control of manufacturing systems. | I |
| 5 | Ability to apply knowledge of mathematics & science | I |