



**CREDIT COURSE OUTLINE**

**I. COVER PAGE**

(1) MFGT 82	(2) Advanced Machine Shop	(3) 4
Number	Title	Units

(4) Lecture / Lab Hours:			(8) Classification:		
Course Hours					
	Weekly Lec hours:	27.00	Degree applicable:		X
	Weekly Lab hours:	144.00	Non-degree applicable:		
	Total Contact hours:		Basic skills:		
Lec will generate __ hour(s) outside work.			(9)RC Fulfills AS/AA degree requirement: (area)		
Lab will generate __ hour(s) outside work.			General education category:		
			Major:		
			Certificate of:		
			Certificate in:		
(5) Grading Basis:	Grading Scale Only				
	Pass/No Pass option	X			
	Pass/No Pass only				
(6) Advisories:	<ul style="list-style-type: none"> <li>Eligibility for English 126 Eligibility for Math 101</li> </ul>		(10)CSU	Baccalaureate:	X
(7) Pre-requisites (requires C grade or better):	<ul style="list-style-type: none"> <li>Mfgt 81, or equivalent course or verified work experience in the field</li> </ul>		(11)Repeatable: (A course may be repeated three times)		0
Corequisites:			(12)C-ID:		
			Proposed Start Date:		Fall 2012

(12) Catalog Description:  
 Advanced machine shop practices, lathe, mill and CNC operations. CNC programming for turning and milling operations. Introduction to CAD (Computer Aided Design) and CAM (Computer Aided Manufacturing)

**II. COURSE OUTCOMES:**

*(Specify the learning skills the student demonstrates through completing the course and link critical thinking skills to specific course content and objectives.)*

Upon completion of this course, students will be able to:

- I. Practice safe shop techniques in operating both hand tools and machinery.
- II. Calculate advanced mathematical problems associated with part fabrication and machinery operation.
- III. Consistently execute daily assigned work in a timely and professional manner.

**III. COURSE OBJECTIVES:**

*(Specify major objectives in terms of the observable knowledge and/or skills to be attained.)*

In the process of completing this course, students will:

- I. Select and properly use tools of the machine trade.
- II. Perform precision measurement and layout needed in the machine trade.
- III. Propose proper material for a prescribed project and calculate necessary cuts for the job.
- IV. Set up and perform advanced machining operations on conventional and CNC machine shop equipment.
- V. Identify potential hazards in machine operation and revise techniques to optimize safety.
- VI. Prepare accurate and correct calculations to precisely set machines for close tolerance work.
- VII. Illustrate work discipline through use of a time clock and progress on assigned task.
- VIII. Set up and operate CNC Turning and Machining Centers.
- IX. Program both CNC Turning and Machining Centers.
- X. Successfully use CAD / CAM programs to create a part, tool path and program for CNC machinery.

**IV. COURSE OUTLINE:**

**Lecture Content:**

- A. Manufacturing Technology Orientation
  1. Introductory tour of shop machinery
  2. Class work routines
- B. Review
  1. Shop Safety
  2. Advanced Shop math

- 3. Measurement
- C. CNC Operation and Setup
  - 1. Cartesian Coordinates
  - 2. Machine G codes and letter words
  - 3. Offsets
  - 4. Set up and operation
- D. CNC Manual Programming
  - 1. Canned cycles
  - 2. Sub programs
- E. Computer Aided Manufacturing
  - 1. Mastercam software
  - 2. Post processing
- F. Computer Aided Design
  - 1. Solid Works software
  - 2. Mastercam software

**Lab Content:**

- A. Measurement
  - 1. Review measurement instruments and techniques
  - 2. Advanced shop math
  - 3. Trigonometry for tool path calculation
- B. CNC manual programming
  - 1. G code entry into machine
  - 2. Part offset entry
  - 3. Tool offset entry
- C. CNC software
  - 1. Mastercam CAM practice
  - 2. SolidWorks CAD practice
  - 3. Post processing

**V. APPROPRIATE READINGS**

**Reading assignments may include but are not limited to the following:**

- I. Sample Text Title:
  - 1. Recommended - Hoffman, P, J *Precision Machining Technology*, Delmar Cengage Learning, 2012,
  - 2. Recommended - Oberg, E *Machinery's Handbook*, ed. 29 Industrial Press, 2012,
- II. Other Readings
  - 1. Recommended - *Sample Lab Workbook: Haas Programming Workbook, June 2006*

Global or international materials or concepts are appropriately included in this course  
 Multicultural materials and concepts are appropriately included in this course

If either line is checked, write a paragraph indicating specifically how global/international and/or multicultural materials and concepts relate to content outline and/or readings.

**VI. METHODS TO MEASURE STUDENT ACHIEVEMENT AND DETERMINE GRADES:**

Students in this course will be graded in at least one of the following four categories. Please check those appropriate. A degree applicable course must have a minimum of one response in category A, B, or C.

<b>A. Writing</b>			
Check either 1 or 2 below			
	1. <i>Substantial writing assignments are required. Check the appropriate boxes below and provide a written description in the space provided.</i>		
X	2. <i>Substantial writing assignments are NOT required. If this box is checked leave this section blank. For degree applicable courses you must complete category B and/or C.</i>		
	a) essay exam(s)		d) written homework
	b) term or other paper(s)		e) reading reports
	c) laboratory report(s)		f) other (specify)

**Required assignments may include but are not limited to the following:**

<b>B. Problem Solving</b>			
Computational or non-computational problem-solving demonstrations, including:			
X	a) exam(s)		d) laboratory reports
X	b) quizzes		e) field work

X	c) homework problems	X	f) other (specify): Laboratory assignments
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**Required assignments may include but are not limited to the following:**

Sample questions:

1. Written True / False and multiple choice exams and quizzes that require application of key concepts.
2. Homework assigned weekly based on topic for the week.
3. Individual assignments using internet and other library resources.
4. Approved class projects are assigned to students to problem solve and fabricate.

<b>C. Skill demonstrations, including:</b>			
X	a) class performance(s)	X	c) performance exams(s)
	b) field work		d) other (specify)

**Required assignments may include but are not limited to the following:**

1. Measurement test requires demonstration of sufficient skill before passing to machine work.
2. Class performance is measured daily for participation, work produced and overall quality of working environment created.
3. Individual projects of student's choice approved by instructor demonstrate mastery of design and fabrication process.

<b>D. Objective examinations including:</b>			
X	a) multiple choice	X	d) completion
X	b) true/false		e) other (specify):
X	c) matching items		

**COURSE GRADE DETERMINATION:**

Description/explanation: Based on the categories checked in A-D, it is the recommendation of the department that the instructor's grading methods fall within the following departmental guidelines; however, the final method of grading is still at the discretion of the individual instructor. The instructor's syllabus must reflect the criteria by which the student's grade has been determined. (A minimum of five (5) grades must be recorded on the final roster.)

If several methods to measure student achievement are used, indicate here the approximate weight or percentage each has in determining student final grades.

Problem Solving 20 - 40% Skills Demonstration 40 - 60% Objective Examination 20 - 40%

**VII. EDUCATIONAL MATERIALS**

For degree applicable courses, the adopted texts, as listed in the college bookstore, or instructor-prepared materials have been certified to contain college-level materials.

Validation Language Level (check where applicable):

	College-Level Criteria Met	
	YES	NO
Textbook	<u>  X  </u>	<u>      </u>
Reference materials	<u>  X  </u>	<u>      </u>
Instructor-prepared materials	<u>  X  </u>	<u>      </u>
Audio-visual materials	<u>  X  </u>	<u>      </u>

Indicate Method of evaluation:

- Used readability formulae (grade level 10 or higher)
- Text is used in a college-level course   X
- Used grading provided by publisher
- Other: (please explain; relate to Skills Levels)        -

<i>Computation Level</i> (Eligible for MATH 101 level or higher where applicable)	<u>  X  </u>	<u>      </u>
Content		
Breadth of ideas covered clearly meets college-level learning objectives of this course	<u>  X  </u>	<u>      </u>
Presentation of content and/or exercises/projects:		
Requires a variety of problem-solving strategies including inductive and deductive reasoning.	<u>  X  </u>	<u>      </u>
Requires independent thought and study	<u>  X  </u>	<u>      </u>
Applies transferring knowledge and skills appropriately and efficiently to new situations or problems.	<u>  X  </u>	<u>      </u>
List of Reading/Educational Materials		
Recommended - Hoffman, P, J <i>Precision Machining Technology</i> , Delmar Cengage Learning, 2012,		
Recommended - Oberg, E <i>Machinery's Handbook</i> , ed. 29 Industrial Press, 2012,		

Comments:

<input type="checkbox"/>	This course requires special or additional library materials (list attached).
<input checked="" type="checkbox"/>	This course requires special facilities: Machine Shop

Attached Files:

[Manufacturing Pathway](#)

**BASIC SKILLS ADVISORIES PAGE** The skills listed are those needed for eligibility for English 125, 126, and Math 201. These skills are listed as the outcomes from English 252, 262, and Math 250. In the right hand column, list at least three major basic skills needed at the beginning of the target course and check off the corresponding basic skills listed at the left.

Eligibility for ENGL 126  
(as outcomes for ENGL 262)

- apply a variety of vocabulary skills for increased comprehension during reading.
- apply prereading and active reading strategies to increase success with and comprehension of unfamiliar texts.
- analyze expository texts to determine explicit/implicit main ideas and logical support, leading to author's intended meaning.
- determine basic organizational writing patterns to increase comprehension of expository texts.
- distinguish between fact and opinion and determine author's tone and purpose in non-fiction writings.

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- Identify potential hazards in machine operation and revise techniques to optimize safety.
- Prepare accurate and correct calculations to precisely set machines for close tolerance work.
- Illustrate work discipline through use of a time clock and progress on assigned task.
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- Program both CNC Turning and Machining Centers.
- Successfully use CAD / CAM programs to create a part, tool path and program for CNC machinery.

Check the appropriate spaces.

- Eligibility for Math 201 is advisory for the target course.
- Eligibility for English 126 is advisory for the target course.
- Eligibility for English 125 is advisory for the target course.

*If the reviewers determine that an advisory or advisories in Basic Skills are all that are necessary for success in the target course, stop here, provide the required signatures, and forward this form to the department chair, the appropriate associate dean, and the curriculum committee.*

## REQUISITES

### Corequisite -- MFGT 81 Intermediate Machine Shop

- Practice safe shop techniques in operating both hand tools and machinery.
- Fabricate parts and operate machinery using advanced mathematical calculations to analyze problems.
- Work with CNC equipment at an operator level.

- Select and properly use tools of the machine trade.
- Perform precision measurement and layout needed in the machine trade.
- Set up and perform advanced machining operations on conventional and CNC machine shop equipment.
- Set up and operate CNC Turning and Machining Centers.

## ESTABLISHING PREREQUISITES OR COREQUISITES

Every prerequisite or corequisite requires content review plus justification of at least one of the seven kinds below. Prerequisite courses in communication and math outside of their disciplines require justification through statistical evidence. Kinds of justification that may establish a prerequisite are listed below.

Check one of the following that apply. Documentation may be attached.

Significant statistical evidence indicates that the absence of the prerequisite course is related to unsatisfactory performance in the target course.

Justification: Indicate how this is so.

The health or safety of the students in this course requires the prerequisite.

Justification: Indicate how this is so.

The prerequisite course is part of a sequence of courses within or across a discipline.

The prerequisite is required in order for the course to be accepted for transfer to the UC or CSU systems.

Justification: Indicate how this is so.

The prerequisite/corequisite is required by law or government regulations.

Explain or cite regulation numbers:

The safety or equipment operation skills learned in the prerequisite course are required for the successful or safe completion of this course.

Justification: Indicate how this is so.

The safety or equipment operation skills learned in the prerequisite course are required for the successful or safe completion of this course.

Justification: Indicate how this is so.

Three CSU/UC campuses require an equivalent prerequisite or corequisite for a course equivalent to the target course:

**Justification:**

## JUSTIFICATION OF LIMITATION ON ENROLLMENT

Enrollment in courses or blocks of courses may be limited based on performance, honors, or other performance based criteria. Be mindful of the disproportionate impact the limitation will have on specific groups of students. It is important to determine if the limitation will disproportionately keep under-represented students from enrolling in the course or block of courses.

Describe the reasons for limiting the enrollment.

Course Designator: MFGT 82

Course Title(s): Advanced Machine Shop

Rationale for Limiting Enrollment:

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