Modesto Junior College  
Course Outline of Record  
**MFGA 222**

I. **OVERVIEW**  
The following information will appear in the 2011 - 2012 catalog

**MFGA 222 CNC Machine Operations**  
2 Units

*Also offered as:* MACH - 222: CNC Machine Operations  
*Recommended for Success:* Before enrolling in this course, students are strongly advised to concurrently enroll in MFGA 219, 220 or 221 and have years of machining experience.

The setup and operation of computer controlled machine tools with emphasis upon vertical machining centers and two axis turning centers. Primary controller operation, machine setup, tooling application, installation and adjustment and basic codes needed for editing will be addressed.

*Materials Fee Required*  
Field trips might be required.  
(A-F or P/NP - Student choice) Lecture /Lab  
Transfer: (CSU)

II. **LEARNING CONTEXT**  
Given the following learning context, the student who satisfactorily completes this course should be able to achieve the goals specified in Section III, Desired Learning:

A. **COURSE CONTENT**

1. **Required Content:**
   
   a. Theory of Operation of CNC Machine Tools  
      i. Types of control systems  
      ii. Coordinate system

   b. Controller Operation  
      i. Manual data input  
      ii. Tool offsets  
      iii. Manual input and editing of programs  
      iv. General control functions

   c. Machine Setup and Tooling  
      i. Typical part holding techniques  
      ii. Typical cutting tools employed

2. **Required Lab Content:**

   The laboratory content provides students with the hands-on experience and time on using various
precision measuring tools and equipment. The exposure via these assigned metallurgy projects develop student confidence for the machining trade:

a. Types of control systems
b. Coordinate system
c. Controller Operation
d. Manual data input
e. Tool offsets
f. Manual input and editing of programs
g. General control functions
h. Machine Setup and Tooling
i. Typical part holding techniques
j. Typical cutting tools employed

B. **ENROLLMENT RESTRICTIONS**

1. **Advisories**

   Before enrolling in this course, students are strongly advised to concurrently enroll in MFGA 219, 220 or 221 and have years of machining experience.

C. **HOURS AND UNITS**

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<tr>
<th>INST METHOD</th>
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<th>UNITS</th>
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<tr>
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D. **METHODS OF INSTRUCTION (TYPICAL)**

Instructors of the course might conduct the course using the following method:

1. Lecture
2. Videos/CDs
3. Equipment Demonstrations
4. Individual student feedback on MACH 222 projects

E. **ASSIGNMENTS (TYPICAL)**

1. **EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS**

   Time spent on coursework in addition to hours of instruction (lecture hours)

   a. Per Term, Reading Assignments
b. Per Term, Preparation for Exam
c. Per Term, Completion of Laboratory Assignments
2. EVIDENCE OF CRITICAL THINKING

Assignments require the appropriate level of critical thinking

a. Question 1: How is a tool mounted in the spindle of the machine?

b. Question 2: List five tools commonly used on machining centers.

c. Typical Laboratory Assignments: (1) Student, weighing options, plots the most efficient and appropriate operations sequence for CNC Operations; (2) Student inspects, evaluates, and if necessary, reworks project and (3) Student submits project and completed operational sequence form and inspection report.

F. TEXTS AND OTHER READINGS (TYPICAL)

1. Other: Protective Eye Gear

III. DESIRED LEARNING

A. COURSE GOAL

As a result of satisfactory completion of this course, the student should be prepared to:

(1) given a basic 3 axis CNC machining center with the appropriate tooling and measuring tools, the student will be able to set up the machine, establish necessary tool and work offsets and produce a part requiring the use of 5 tools to within stated tolerance within two hours and (2) given a basic 2 axis CNC chucking center with the appropriate tooling and measuring tools, the student will be able to set up the machine using workholding collets, establish necessary tool and work offsets, and produce a threaded part requiring the use of 6 tools to within stated tolerance within two hours.

B. STUDENT LEARNING GOALS

Mastery of the following learning goals will enable the student to achieve the overall course goal.

1. Required Learning Goals

Upon satisfactory completion of this course, the student will be able to:

a. Identify the primary operating components of typical CNC (Computerized Numeric Control) machine tools.

b. Identify and address the controlling system of the machine in use and properly establish all needed working parameters.

c. Identify commonly used codes to allow minor editing through the machine controller.

2. Lab Learning Goals

Upon satisfactory completion of the lab portion of this course, the student will be able to:

a. Prepare typical work holding setups used with CNC machining and turning centers.

b. Install and maintain a variety of typical cutting tools used on CNC turning and machining centers.

IV. METHODS OF ASSESSMENT (TYPICAL)

A. FORMATIVE ASSESSMENT

1. Mechanical inspection and evaluations of projects.
2. Observations of performance and work habits during lab.

B. SUMMATIVE ASSESSMENT

1. Mid Term and Final Exams

2. Use performance rating sheets to judge safety, accuracy and workmanship