Modesto Junior College
Course Outline of Record

MFGA 301

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

MFGA 301  Machine Shop 1  3 Units

   Also offered as: MACH - 301: Machine Shop 1
   Formerly listed as: MACH - 301: Machine Shop 1

   This class is intended to address the needs of the working student who has had some
   experience in the manufacturing areas of the economy. The study and application of basic
   measuring tools, (steel rulers, vernier calipers & micrometers), layout tools and hand tools are
   addressed. The theory and practice of the use of drilling machines, bandsaws, lathes and
   vertical milling machines are a primary focus.

   Materials Fee Required

   Field trips are not required. (A-F or P/NP - Student choice) Lecture /Lab

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:

         Note: The content of this class is basically the same as MACH 211, as are the Objectives. The
         sequential 300 series of classes (MACH 301) have been developed to meet the needs and time
         constraints of the older, working student, who is currently involved in a manufacturing industry and
         needs to further develop skills to maintain employability or position themselves for advancement.
         This student typically is not available to take daytime classes, has had considerable exposure to the
         subject matter, is likely to be familiar with the equipment, and is able to move through the curriculum
         at a much faster pace. It is the intent in each series of classes to address the same topics and at the
         end of each sequential course advance the student to the same level of competency.

         a. Orientation

            i. Introduction

            ii. Career options in field

            iii. Lab tour

         b. Safety

            i. Lecture – Discussion

            ii. Test

         c. History of Machine Tools in Metalworking

         d. Measuring Tools

            i. Steel rules
ii. Vernier calipers

iii. Dial calipers

iv. Micrometers

v. Dividers

vi. Protractors

vii. Dial Indicators

e. Blueprints and Shop Drawings

f. Bench Work
   i. Hand tools
   ii. Hammers
   iii. Saws
   iv. Files
   v. Wrenches

g. Layout Procedures
   i. Scribers
   ii. Punches
   iii. Squares

h. Drill Press Work
   i. Drilling
   ii. Reaming
   iii. Counter-boring
   iv. Counter-sinking

i. Lathe Operations
   i. Turning
   ii. Facing
   iii. Boring
   iv. Knurling
   v. Form turning
   vi. Grooving
   vii. Taper turning
      a. compound rest
b. tailstock offset

viii. Work holding devices
   a. chucks
   b. between centers
   c. collets

j. Milling Operations
   i. Key slots
   ii. Squaring rough stock
   iii. Precision hole production (drilling, boring, reaming, tapping)

k. Metal Removal Tools
   i. Speeds
   ii. Feeds
   iii. Depth of cut
   iv. Cutting tool geometry
   v. Cutting tool grinding

l. Screw Threads
   i. Applications
   ii. Terminology
   iii. Production Methods

2. **Required Lab Content:**

   Lab content focus provide students with hands-on experience and time on using various tools and equipment that help students gain confidence through various metal projects:

   a. Manual Mill Equipment Projects
   b. Manual Lathe Equipment Projects
   c. Drill Press Equipment Projects
   d. Caliper and Micrometer Measuring Assignments
B. **HOURS AND UNITS**

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C. **METHODS OF INSTRUCTION (TYPICAL)**

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

1. Class Lecture
2. Class and Lab Demonstrations
3. Multi media: video tapes, DVD, Internet Links and powerpoint
4. Professor student feedback on lab assignments

D. **ASSIGNMENTS (TYPICAL)**

1. **EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS**
   Time spent on coursework in addition to hours of instruction (lecture hours)
   a. Weekly Chapter Reading Assignments
   b. Weekly Homework Assignments
   c. Per Term preparation for Mid Term Exam
   d. Per Term preparation for Final Exam

2. **EVIDENCE OF CRITICAL THINKING**
   Assignments require the appropriate level of critical thinking
   a. What may happen if too fast of a blade speed is used in Sawing?
   b. When using a horizontal bandsaw part what is the purpose of the roller guide brackets?
   c. Define drilling, boring and reaming.
   d. List seven main causes of milling cutter failure and state how each can be minimized.

E. **TEXTS AND OTHER READINGS (TYPICAL)**

4. Other: Weaver, Jeff. MACH 301 Syllabus

III. **DESIRED LEARNING**

A. **COURSE GOAL**
As a result of satisfactory completion of this course, the student should be prepared to:

operate a manual metal cutting lathe; operate a manual vertical milling machine; perform hole making operations such as drilling, reaming, boring, and tapping; perform basic cutting tool design and sharpening; perform basic precision measuring operations using scales, vernier calipers, dial calipers, micrometers, and dial indicators as encountered in precision metal cutting; and work safely in a shop environment.

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 setup and properly use various work holding devices on the lathe and vertical milling machine.
   b. Calculate the appropriate cutting speed, spindle speed and feed rates for all cuts.
   c. Determine proper size and be able to cut key slots using an end mill cutter and vertical milling machine.
   d. Define screw thread terminology and describe the means by which screw threads are produced and measured.
   e. Conduct precision and semi-precision measurement in the traditional inch system.
   f. Convert fractions to their decimal equivalents.
   g. Interpret lines, symbols and notes on one and two view mechanical drawings.
   h. Identify cutting tool geometry and grind single point lathe tools and twist drills.

2. Lab Learning Goals
   Upon satisfactory completion of the lab portion of this course, the student will be able to:
   a. Identify the setup and properly use various work holding devices on the lathe and vertical milling machine.
   b. Turn cylindrical and conical surfaces both internal and external, using the lathe.
   c. Determine proper size and be able to cut key slots using an end mill cutter and vertical milling machine.
   d. Cut aluminum and steel parts to rectangular size within .005 inch.
   e. Measure with steel rules to 1/64 inch and with micrometers and vernier calipers to .001 inch.
   f. Safely operate the drill press, pedestal grinder, engine lathe, and vertical milling machine.
   g. Inspect and evaluate finished work pieces utilizing precision measuring tools.

IV. METHODS OF ASSESSMENT (TYPICAL)

A. FORMATIVE ASSESSMENT
   1. Observation of performance and work habits
   2. Mechanical inspection and measurement of projects

B. SUMMATIVE ASSESSMENT
1. Midterm and final exams

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