

EL CAMINO COLLEGE

MACHINE TOOL TECHNOLOGY 107

"Advanced Manufacturing Processes"

H. E. Hofmann Jr – Instructor

Phone: (310)660-3593 X3292– Office

Office – ITEC – 6

(310)660-3593 X5291 – Tool Crib

Office Hours – 4:30 – 5:30 pm M Tu W Th

email: hhofmann@elcamino.edu

COURSE OUTLINE

A. CATALOG AND CLASS SCHEDULE DESCRIPTION:

1. Class Schedule:

5:30 – 6:46 M W

Lecture

ITEC 18

6:50 – 10:00 M W

Lab

ITEC 5

2. Catalog Description

Lecture: 2 hours

Laboratory: 6 hours

Units: 4

This course covers the principles and operation of machine tools with an emphasis on advanced manufacturing processes and machines, such as EDM (Electrical Discharge Machines), abrasive water jet machines, and grinding machines. Additional topics will include abrasives; coordinate measuring machines, advanced precision measurement, GD&T (Geometric Dimensioning and Tolerancing), optical comparators and practices and setups as applied in industry.

Laboratory projects and/or exercises related to the lectures and demonstrations will be assigned, in addition to supplemental machine tool operations of drilling, milling, grinding and lathe machines.

NOTE: LETTER GRADE OR CREDIT/NON CREDIT OPTION

Prerequisite:

Machine Tool Technology 13A, MTT 101abcd, or 46, (or the former Machine Tool Technology 1A) with a minimum grade of C in prerequisite or equivalent.

B. MACHINE TOOL TECHNOLOGY CURRICULUM:

1. Objectives

The objective of the machine tool technology curriculum is to prepare students for gainful employment in machine shops, tool rooms, instrument and experimental laboratories or review and upgrade the skills of employed industrial personnel. The capable graduate may expect to enter industry as an advanced apprentice machinist or machine operator and anticipate advancement to journeyman machinist, tool and die maker, experimental machinist or numerical control programmer.

2. Emphasis

The major portion of the curriculum is to be utilized in the exploration of machine tool technology with emphasis on:

- | | |
|---------------------------|----------------------|
| a. Safety | h. Milling machines |
| b. Hand tools | i. Numerical Control |
| c. Measurement and layout | lathe and milling |
| d. Bench work | machines |
| e. Power saws | j. Grinding machines |
| g. Engine lathes | k. Heat treatment |

The reading assignments, discussions, demonstrations and laboratory assignments will cover these and related areas of machine tool technology and emphasize their application in a variety of industrial situations.

C. MACHINE TOOL TECHNOLOGY 107abcd OBJECTIVES:

Each student, after receiving lectures, demonstrations and laboratory assignments, will be able to:

1. Correctly apply machine shop safety practices with 100% accuracy.
2. Correctly use hand tools, measuring tools, layout tools, power saws, drilling machines, engine lathes, milling machines, and grinding machines to perform supplemental machine operations on assigned work within the tolerances specified engineering drawings.
3. Select and use cylindrical squares, precision height gauges, vernier bevel protractors, gauge blocks and sine bars to inspect assigned work within the tolerances specified on engineering drawings.

4. Interpret geometrically dimensioned and toleranced engineering drawings to assist in producing assigned work within the tolerances specified on engineering drawings.
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5. Solve shop mathematics problems involving trigonometry and its application to sine bars, speeds and feeds, grinding machines, precision measurement, and engineering drawing interpretation.
6. Set up and operate surface grinders and cylindrical grinders to produce assigned work within the tolerances specified on engineering drawings.
7. Set up and operate a coordinate measuring machine and optical comparator to inspect assigned work within the tolerances specified on engineering drawings.
8. Set up and operate sinker and wire electrical machines (EDM) to produce assigned work within the tolerances specified on engineering drawings.
9. Set up and operate abrasive water jet machines to produce assigned work within the tolerances specified on engineering drawings.

STUDENT LEARNING OUTCOME:

Comparison of Advanced Manufacturing Cutting Processes

Record the benefits and downsides of the following processes: Waterjet cutting, EDM wire cutting, Plasma cutting and Laser cutting

DISABILITY:

El Camino College adheres to all applicable federal, state, and local laws, regulations and guidelines with respect to providing reasonable accommodations for students with temporary and permanent disabilities. If you have a disability that may adversely affect your work in this class, I encourage you to register with the Special Resource Center (SRC) and talk to me about how I can best help you. All disclosures of disabilities will be kept strictly confidential. **Note:** For more information about the Special Resource Center, please call 660-3295 or visit (SRC) Room F-10.

D. TEXT

TECHNOLOGY OF MACHINE TOOLS by S. F. Krar, A. R. Gill, P. Smid –
McGraw Hill – current edition-ISBN 0-07-830722-8

E. REQUIRED* AND RECOMMENDED MATERIALS:

1. Scientific calculator (trigonometry functions)
2. Safety glasses or goggles*
3. Flexible 6 inch steel rule
4. Clean shop coat or apron
5. Lathe tool bits (3/8" square H.S.S.)*
6. Materials for projects*
7. Clipboard
8. 3.5 floppy diskette or flash drive

F. EVALUATION INFORMATION:

1. The semester's evaluation (grade) will be based on grades or points received on:
 - a. Homework assignments
 - b. Notebook
 - c. Mid-term examination
 - d. Final examination
Total lecture points = 25% of grade
 - e. Laboratory work
Total lab points = 75% of grade

Other factors that influence evaluation:

- a. Attendance and attitude

Attendance at First Class

Students who enroll in class but do not attend the first scheduled class meeting may be dropped from the roster and their places given to waiting students who were unable to enroll at the time of registration. If illness or emergency prevents a student from attending the first class session, the student must contact the instructor.

A student who registers for a class and never attends is still responsible for dropping the class. Failure to properly drop a class may result in a "W" and may subject the student for any and all fees associated with the class.

Attendance During Semester

Students are expected to attend their classes regularly. Students who miss the first class meeting or who are not in regular attendance during the add period for the class may be dropped by the instructor. Students whose absences from a class exceed 10% of the scheduled class meeting time may be dropped by the instructor. However, students are responsible for dropping a class within the deadlines published in the class schedule. Students who stop attending but do not drop may still be retained on the course roster and receive a failing grade. Students may view their registration status using the college's Web site.

Withdrawal from Class

Official withdrawal from class must be processed through the online system in the Admissions Office. Failure to complete this process may result in the assignment of a letter grade of A through F.

Dropping a Class

It is the responsibility of the student to officially drop a class by the deadline date.

This class meets about 30 times, so 3 absences or less will be acceptable. Remember that Tardies and Left Earlies are 1/3 of class absent.

- b. Care and use of equipment
- c. Ability to follow instructions
- d. Mechanical judgment

2. The following scale will be used to determine the final grade of the semester. Remember that lab work counts for 3 times the points as lecture work.

90% - 100% = A
80% - 89% = B
70% - 79% = C
60% - 69% = D
Below 59% = F

3. Laboratory work criteria:

- a. The primary criteria is the quality of the work produced, which is a function of sizes, fits and finishes as specified by engineering drawing specifications.
- b. The secondary criteria is the quantity or variety of work; this does not mean total weight or size, but rather the variety of machine tool operations performed and general difficulty of the product produced.

- c. It will be assumed that all laboratory work submitted for evaluation will represent the student's best efforts.
 - d. As a significant portion of the class time will be spent in the laboratory, approximately $\frac{3}{4}$ (75%) of the semester's evaluation will be based on this area of work.
 - e. All laboratory projects/exercises will be burred, inspected and submitted for evaluation as they are completed. These will be scored and returned at the end of the semester.
4. Mid-term and Final examinations will be of the objective nature such as:
- a. True/False
 - b. Short fill-in
 - c. Essay
 - d. Matching
 - e. Multiple choice
 - f. Program for machine

Mid-term and examinations will be used to evaluate your comprehension of reading assignments, lectures and demonstrations. A grade of "zero" will be recorded if you are absent when a quiz or examination is given to the class.

G. CLASS ROUTINE:

- 1. Lecture
- 2. Laboratory
- 3. Tool crib

H. ADMINISTRATIVE CARDS:

I. LABORATORY WORK ASSIGNMENTS:

Projects:

Semester Appropriate Project
Class Project

NOTE: Additional or supplementary areas of laboratory work or projects may be added or substituted only with the approval of the instructor.

APPROXIMATE TIME ALLOTTED IN HOURS	MAJOR TOPICS
5	Orientation: Safety – Review
4	Review – Basic and supplemental machining operations:
12	Grinding operations: Surface grinding Cylindrical grinding Tool and cutter grinding
8	Abrasives: Coated Bonded
28	Advanced precision measurement: Coordinate measuring machine Optical comparator Hardness testing Cylindrical square Vernier protractor
8	Applied trigonometry Sine bars and plates Gage blocks Engineering drawing applications
10	Geometric Dimensioning and Tolerancing (GD&T) General rules Datums Modifiers
30	Electrical Discharge Machines (EDM): Cutting process and procedures Dielectric fluids Overcut and tolerances Sinker Wire
30	Abrasive water jet machines: Cutting process and procedures Stream and kerf width Abrasive types Piercing Cutting techniques
7	Review and examinations

