

EL CAMINO COLLEGE

MACHINE TOOL TECHNOLOGY 101

"Introduction to Conventional and CNC Machining"

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COURSE OUTLINE

A. CATALOG AND CLASS SCHEDULE DESCRIPTION:

1. Class Schedule:

5:30 - 6:20 Tu	Lecture	ITEC 18
5:30 - 6:35 Th	Lecture	ITEC 18
6:45 – 9:50 Tu Th	Lab	ITEC 6

2. Catalog Description

Lecture: 2 hours Laboratory: 6 hours Units: 4

This introductory course covers the principles and operation of conventional and CNC (Computer Numerically Controlled) machine tools with an emphasis on safety, measurement, hand tools, power saws, drilling machines, lathes and milling and grinding machines focusing on practices and set ups used 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: None

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 101abcd STUDENT LEARNING 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. Select and use metal working hand tools to produce assigned work within the tolerances specified on engineering drawings.
3. Measure and layout utilizing semi-precision and precision measuring tool to produce assigned work within the tolerances specified on engineering drawings.

4. Set up and operate power saws to rough finish assigned work within a minimum of 1/32 of an inch over the dimensions required on engineering drawings.
5. Center drill, drill, ream, countersink, counterbore and tap threads to produce assigned work within the tolerances specified on engineering drawings.
6. Set up and operate engine lathes to turn, face, center drill, thread and cut off to produce assigned work within the tolerances specified on engineering drawings.
7. Set up and operate vertical and horizontal milling machines to square stock, mill flat surfaces, side mill, end mill, fly cut and slot to produce assigned work within the tolerances specified on engineering drawings.
8. Set up and operate grinding machines to sharpen lathe tool bits, and surface grind to produce assigned work within the tolerances specified on the engineering drawing.
9. Interpret orthographic projection engineering drawings that incorporate geometric dimensioning and tolerancing to produce assigned work within the tolerances specified on engineering drawings.
10. Solve shop math problems that involve speeds and feeds, threads, engineering drawing interpretation and calculations relating to machine tools.

STUDENT LEARNING OUTCOME:

Precision Measurement with a Micrometer

Given a ground steel block of known and verified dimensions, measure and record the three dimensions of the block using a micrometer to a precision of 0.001 inches.

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

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. Clip board
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 Earlys are 1/3 of class absent.

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

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. Matching
 - d. Multiple choice

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 WEEKS	MAJOR TOPICS
8	Orientation Machine tool technology analysis Safe shop practices in metal working Hand tools and bench work
8	Machine tool calculations Speeds and feeds Lathe toolbit geometry
16	Measurement and measuring tools
8	Layout tools
8	Materials of manufacture
8	Reading engineering drawings
8	Powersaws
16	Engine lathes
16	Threads
8	Drilling operations
8	Conventional milling machines
16	CNC milling machines, introduction and demonstration
8	Grinding machines
8	Review and examinations