

EL CAMINO COLLEGE

MACHINE TOOL TECHNOLOGY 103abcd

"Conventional and CNC Turning"

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COURSE OUTLINE

A. CATALOG AND CLASS SCHEDULE DESCRIPTION:

1. Class Schedule:

5:30 – 6:20 M	Lecture	C – 101
5:30 – 6:35 W	Lecture	C – 101
6:45 – 9:55 M W	Lab	C - 103

2. Catalog Description

Lecture: 2 hours Laboratory: 6 hours Units: 4

This course covers at an advanced level the principles and operation of conventional and computer numerically controlled (CNC) machine tools with an emphasis on the set up and operation of lathes. Topics will include safety, turning, drilling, boring, threading, cutting tools, CNC programming 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, and grinding machines.

NOTE: LETTER GRADE OR P/NP 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 | g. Milling machines |
| b. Hand tools | h. Numerical Control |
| c. Measurement and layout | lathe and milling |
| d. Bench work | machines |
| e. Power saws | i. Grinding machines |
| f. Engine lathes | j. 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 103abcd 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 projects or exercises within the tolerances specified on engineering drawings.
3. Measure and layout utilizing semi-precision and precision measuring tool to produce and inspect assigned projects or exercises within the tolerances specified on engineering drawings.

4. Correctly use power saws, drilling machines, milling machines and grinding machines to perform supplemental machine tool operations on assigned projects or exercises within the tolerances specified on engineering drawings.
5. Correctly use engine lathes to perform the advanced engine lathe operations of straight and taper turning, form turning, face, center drill, drill, ream, bore, knurl, thread, and cutoff to produce assigned projects or exercises within the tolerances specified on engineering drawings.
6. Correctly set-up and operate a CNC lathe to do: straight and taper turning, and radius turning producing projects or exercises within the tolerances specified on engineering drawings.
7. Correctly solve shop math problems that involve: speed and feeds, trigonometry, tapers, threads, engineering drawing interpretation and calculations relating to machine tool with an accuracy of 60% or more.
8. Correctly answer objective questions about the above and related areas of machine tool technology with an accuracy of 60% or more.

STUDENT LEARNING OUTCOME:

Students will turn a part on the lathe to a given drawing dimension to an accuracy of +/- .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-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*

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 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

Example of grading: A second semester student is expected to do the drilling exercise, precision parallels, hammer project and all assigned exercises with an accuracy of 90% and lecture of 90% to earn a grade of "A".

More advance students will be graded on the amount and difficulty of the work.

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

Lecture or Lab	Approximate Hours	Topic Number	Major Topic
Lecture	8	I	Orientation and safety review
Lecture	8	II	Review - basic machining and supplemental processes
Lecture	16	III	External lathe operations
Lecture	16	IV	Internal lathe operations
Lecture	8	V	Work-holding devices and tooling
Lecture	8	VI	Threading operations
Lecture	8	VII	CNC programming, commands, formats, Input, proofing, editing
Lecture	16	VIII	Applied trigonometry
Lecture	8	IX	Taper calculations and inspection
Lecture	8	X	Machine Control Units (MCU), Manual Data Input (MDI)
Lecture	8	XI	Tool offsets and tool holding devices
Lecture	24	XII	Set up and CNC lathe operation
Lecture	8	XIII	Review and examinations
Total Lecture Hours		144	
Total Laboratory Hours		0	
Total Hours		144	