

This syllabus belongs to: _____
print student name

EL CAMINO COLLEGE

MACHINE TOOL TECHNOLOGY 103

“CONVENTIONAL AND CNC TURNING”

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COURSE OUTLINE

A: CATALOG AND CLASS SCHEDULE DESCRIPTION:

1. Class Schedule:

11:30 am – 12:30 pm	Tue, Th	Lecture	Communications 102
12:50 pm – 4:00 pm	Tue, Th	Lab	Communications 103

2. Catalog Description:

Lecture: 2 hours/week Laboratory: 6 hours/week Units: 4

This course covers the study of the principles and operation of conventional and computer numerically controlled (CNC) machine tools with an emphasis on: safety, measurement, hand tools, power saws, drilling machines, lathes, milling and grinding machines. The course stresses practices and tool set-ups used in industry. Laboratory projects and/or exercises related to the lecture and demonstrations will be assigned.

NOTE: Letter grade or credit/non-credit option

Prerequisite: MTT 46 or 101abcd (or former MTT 13A) with a minimum grade of C.

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 journey 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 an emphasis on:

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

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 participating in lectures, demonstrations and laboratory assignments, will be able to:

1. Correctly use and apply machine safety practices and answer safety test questions with 100% accuracy.
2. Use and read micrometers, vernier measuring tools and dial indicators to produce assigned projects or exercises within the tolerances specified on engineering drawings.
3. Select and use metalworking hand tools to produce assigned projects or exercises within the tolerances specified on engineering drawings.
4. Measure and layout utilizing semi-precision and precision measuring tools to produce assigned projects or exercises within the tolerances specified on engineering drawings.
5. Weld band saw blades and use power saws to rough finish assigned projects or exercises within a minimum of 1/32 of an inch over the dimensions required on engineering drawings.
6. Use drilling machines to center drill, drill, ream, countersink, counterbore, and tap threads to produce assigned projects or exercises within the tolerances specified on engineering drawings.
7. Use engine lathes to turn, face, center drill, thread, and cut tolerances specified on engineering drawings.
8. Use vertical and horizontal milling machines to square stock, mill flat surfaces, side mill, end mill, fly cut, and slot to produce assigned projects or exercises within the tolerances specified on engineering drawings.
9. Use grinding machines to sharpen lathe tool bits, twist drills and surface grind to produce assigned projects or exercises within the tolerances specified on engineering drawings.
10. Heat treat low carbon steel projects or exercises so they will meet engineering drawing specifications.
11. Interpret orthographic projection engineering drawings that incorporate geometric dimensioning and tolerancing to produce assigned projects or exercises within the tolerances specified on engineering drawings.

12. Correctly solve shop math problems that involve: speeds and feeds, threads, engineering drawing interpretation and calculations relating to machine tools with an accuracy of 60% or more.
13. Correctly answer objective questions about the above and related areas of machine tool technology with an accuracy of 60% or more.

D. STUDENT LEARNING OUTCOME:

Given a piece of steel turning stock, cutter, lathe and micrometer, turn a part on the lathe to a given drawing dimension to an accuracy of +/- 0.001 inches. Students will measure and record the dimensions matching the verified values within +/- 0.001 inches.

E. RECOMMENDED TEXT:

S.F. Krar, Technology of Machine Tools, (7th edition), 2011, McGraw Hill, New York, NY

F. REQUIRED MATERIALS:

1. Clear safety glasses or goggles- sunglasses and tinted glasses are not permitted
2. Closed toe shoes
3. Lathe tool bits
4. Material for projects
5. Flexible 6 inch steel rule
6. Scientific calculator (trigonometric function capable)
7. Pen or pencil
8. 3 ring binder and paper for notes
9. Recommended- shop coat or apron
10. This syllabus

G. EVALUATION INFORMATION:

1. The semester's grade evaluation will be based on grades or points received on:

a.	Mid-term examination		
b.	Final examination	-----	Total 25% of grade
c.	Quizzes		
d.	Homework assignments		
e.	Notebook		
f.	Classroom participation		
g.	Self-evaluation		
h.	Laboratory work	-----	Total 75% of grade

Self evaluation grades count towards student's grades. Students late for class who fill in an 'A' for self evaluation will have this point eliminated and not counted towards their grade.

A notebook must be maintained containing this syllabus, all handouts and notes taken. This notebook must be kept "within reach" during lab work for reference, without it the student may not perform lab work and may be subject to dismissal.

Other factors that influence evaluation:

- a. Attendance, attitude and creative involvement
- b. Care and use of equipment
- c. Ability to follow instructions
- d. Mechanical judgment

2. Classroom/Lab conduct:

Cell phones, laptops and personal electronic devices may not be used in the classroom or lab under any circumstances.

Turn cell phones to vibrate or silent

Exit to a common area to use your cell phone.

Students failing to comply with this cell phone policy will have a participation point removed for each violation.

Cell phone may not be used as calculators during class, lab, quizzes or tests. School property calculators will be made available for these evaluations.

No headphones, music, video or game players during lecture or lab

No personal computers, laptops or personal electronic devices may be used unless approved for specific assignment use by the instructor

No loading games or unapproved software onto lab computers

3. The following scale will be used to determine the final grade for 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 60% = F

4. 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 type 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 75% of the semester's evaluation will be based on this area of work.
- 5. 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

H. CLASS ROUTINE:

1. Quiz
2. Lecture
3. Exercise assignment
4. Lunch break
5. Sign in
6. Lab workplan
7. Machine assignment
8. Tool crib checkout
9. Laboratory work
10. Clean up
11. Tool crib return
12. Sign out/self-evaluation

I. ADMINISTRATIVE PAPERWORK:

1. Emergency Release card
2. Negligent Use and Lockers card
3. Safety Glasses Acknowledgement card
4. Entrance survey
5. Inspection Report
6. Unscheduled Lab Work report
7. Safety test
8. Badges
9. Lab workplan/tool checkout list

J. LABORATORY WORK ASSIGNMENTS, PROJECTS AND EXERCISES:

1. Machine setup and operation exercises
2. Turning exercise
3. Stirling engine components
4. Walking robot components
5. Mini mill components
6. Advanced and personalized challenge projects

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

Note: If you have a documented disability and wish to discuss academic accommodations, please contact me as soon as possible.

K. CLASS TOPICS:

Orientation and Safety	Taper Turning
History of Lathes	Drilling
Review of Shop Mathematics	CNC Fundamentals
Lathe Overview	CNC Setup
Lathe Cutting Tools	CNC Safety
Lathe Workholding	Canned Cycles
Lathe Toolholding	Parametric Programming
Lathe Operations	Graphical Programming
Threads	Trade Tricks
Thread Cutting	

Note: Class schedule is subject to change due to resource availability and requirements.