

This syllabus belongs to: _____
print student name

EL CAMINO COLLEGE

MACHINE TOOL TECHNOLOGY 103-7680 FALL 2015

"CONVENTIONAL AND CNC TURNING"

Professor Eric Carlson
Office – ITEC 6
Office Hours –M, Tu, W 7-8 am ITEC 6

Phone: (310) 660-3593 X5289
Email: ecarlson@elcamino.edu

COURSE OUTLINE

A: CATALOG AND CLASS SCHEDULE DESCRIPTION:

1. Class Schedule:

8:00 am – 8:50 am	Mon	Lecture	ITEC 18
8:00 am – 9:05 am	Wed	Lecture	ITEC 18
9:15 am – 12:20 pm	Mon, Wed	Lab	ITEC 5

2. Catalog Description:

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

In this course, students will study 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 to industry.

NOTE: Letter grade or pass/no pass option

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

B. MACHINE TOOL TECHNOLOGY 103 OBJECTIVES:

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

1. Correctly apply machine shop safety practices with 100% accuracy.
2. Correctly use hand tools, layout tools, measuring tools, power saws, drilling machines, milling machines, and grinding machines.
3. Set up and operate engine lathes to perform the operations of straight and taper turning, form turning, facing, center drilling, drilling, reaming, boring, knurling, threading and cutoff processes to produce assigned work within the tolerances specified on engineering drawings.

4. Set up and operate a CNC lathe to perform straight and taper turning, radius turning, facing, center drilling, drilling, reaming, boring, and cutoff processes to produce assigned work within tolerances specified on engineering drawings.
5. Read, de-bug and edit CNC lathe word address programs to produce assigned work within the tolerances specified on engineering drawings.
6. Enter Manual Data Input (MDI) CNC word address lathe programs to produce work within the tolerances on engineering drawings.
7. Solve shop math problems that include speeds and feeds, trigonometry, tapers, threads, engineering drawing interpretation and calculations relating to machine tools.

C. STUDENT LEARNING OUTCOMES:

SLO #1 Lathe Dimension: Students will turn a part on the lathe to a given drawing dimension to an accuracy of $\pm .001$ inches.

SLO #2 CNC Lathe Programs: Read, de-bug and edit CNC lathe word address programs and enter Manual Data Input (MDI) CNC word address lathe programs to produce work within the tolerances on engineering drawings.

SLO #3 Shop Math: Solve shop math problems that include speeds and feeds, trigonometry, tapers, threads, engineering drawing interpretation and calculations relating to machine tools.

D. RECOMMENDED TEXT:

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

E. 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

F. 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. 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

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 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.

4. Mid-term and Final examinations will be of the objective nature, such as:

- | | | | |
|----|---------------|----|-----------------|
| a. | True/False | c. | Matching |
| b. | Short fill-in | d. | Multiple choice |

G. CLASS POLICIES:

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

Student attendance policy: Students are expected to attend classes regularly. Students who absences exceed 10% of the scheduled class meeting time may be dropped by the instructor.

Academic Honesty: El Camino College places a high value on the integrity of its student scholars. When an instructor determines that there is evidence of dishonesty in any academic work (including, but not limited to cheating, plagiarism, or theft of exam material), disciplinary action appropriate to the misconduct as defined in BP 5500 may be taken. A failing grade on an assignment in which academic dishonesty has occurred and suspension from the class are among the disciplinary actions for academic dishonesty (AP 5520). Students with any questions about the Academic Honesty or discipline policies are encouraged to speak with their instructor in advance.

Accommodations: It is the policy of the El Camino Community College District to encourage full inclusion of people with disabilities in all programs and services. Students with disabilities who believe that may need accommodations in this class should contact the campus Special Resource Center (310) 660-3295, as soon as possible. This will ensure that students are able to fully participate.

H. CLASS ROUTINE:

1. Quiz
2. Lecture
3. Exercise assignment
4. Sign in
5. Lab workplan
6. Machine assignment

7. Tool crib checkout
8. Laboratory work
9. Clean up
10. Tool crib return
11. Sign out/self-evaluation

I. ADMINISTRATIVE PAPERWORK:

1. Emergency Release card
2. Safety Glasses Acknowledgement card
3. Entrance survey
4. Inspection Report
5. Safety test
6. Badges
7. 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.

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 and topics are subject to change due to resource availability and requirements.