

This syllabus belongs to: \_\_\_\_\_  
print student name

**EL CAMINO COLLEGE**

**MACHINE TOOL TECHNOLOGY 101-7677 FA2015**

**“INTRODUCTION TO CONVENTIONAL AND CNC MACHINING”**

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](mailto:ecarlson@elcamino.edu)

**COURSE OUTLINE**

A. CATALOG AND CLASS SCHEDULE DESCRIPTION:

1. Class Schedule:

11:30 am – 12:20 pm	Tues	Lecture	ITEC 18
11:30 am – 12:35 pm	Thurs	Lecture	ITEC 18
2:00 pm – 5:15 pm	Tues, Thurs	Lab	ITEC 5

2. Catalog Description:

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

In this course, students will be introduced to 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 and milling and grinding machines focusing on practices and setups used in industry.

NOTE: Letter grade or pass/no pass option

Prerequisite: None

B. MACHINE TOOL TECHNOLOGY 101 OBJECTIVES:

Upon successful completion of this course, the student will be able to:

1. Correctly use and apply machine safety practices with 100% accuracy.
2. Select and use metal working hand tools to produce assigned projects within the tolerances specified on engineering drawings.

3. Measure and layout utilizing semi-precision and precision measuring tools to produce assigned projects 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 engineering drawings.
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.

C. STUDENT LEARNING OUTCOMES:

SLO #1 Measuring and Recording Dimensions: 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.

SLO #2 Blue Prints: Given a Blue Print, student will use all manufacturing equipment available to manufacture the project on the Blue Print to noted specifications.

SLO #3 Orthographic Projections: The student will be able to solve shop math problems and interpret orthographic projection engineering drawings that incorporate geometric dimensioning and tolerancing to produce assigned work within the tolerances specified on engineering drawings.

D. RECOMMENDED TEXT:

S. F. Krar, Technology of Machine Tools, (7<sup>th</sup> 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. Scientific calculator (trigonometric function capable)

4. Pen or pencil
5. 3 ring binder and paper for notes
6. Recommended- shop coat or apron
7. 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
  - b. Short fill-in
  - c. Matching
  - 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.

F. CLASS ROUTINE:

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

G. ADMINISTRATIVE PAPERWORK:

1. Emergency Release card
2. Safety Glasses Acknowledgement card
3. Entrance Survey
4. Inspection Report
5. Safety test
6. Lab workplan/ tool checkout list

H. LABORATORY WORK ASSIGNMENTS, PROJECTS AND EXERCISES:

1. Machine setup and operation exercises
2. Tool bit sharpening
3. Turning exercise
4. Letter stamping exercise
5. Stirling engine components
6. Walking robot components
7. 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.

I. CLASS TOPICS:

1. Orientation and Safety
2. Careers
3. Lab Procedures
4. History of Machine Tools
5. Drawings and Job Planning
6. Measurement
7. Layout
8. Hand Tools
9. Metalcutting Technology
10. Metallurgy and Heat Treatment
11. Plastics
12. Shop Mathematics
13. Power Sawing
14. Lathes
15. Lathe Accessories and Operations
16. Threads
17. Drilling
18. Milling Machines
19. Milling Accessories and Operations
20. Grinding
21. Computer Numerical Control (CNC)
22. CNC programming
23. Trade Tricks

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