



El Camino College  
COURSE OUTLINE OF RECORD – Official

<b>Course Acronym:</b>	MTT
<b>Course Number:</b>	16
<b>Descriptive Title:</b>	General Metals
<b>Division:</b>	Industry and Technology
<b>Department:</b>	Machine Tool Technology
<b>Course Disciplines:</b>	Machine Tool Technology
<b>Catalog Description:</b>	This course covers the general skills of metal working: machine shop practice, welding, bench work, art metal, foundry and sheet metal, design, construction and occupational exploration.
<b>Prerequisite:</b>	
<b>Co-requisite:</b>	
<b>Recommended Preparation:</b>	
<b>Enrollment Limitation:</b>	
<b>Hours Lecture (per week):</b>	2
<b>Hours Laboratory (per week):</b>	4
<b>Outside Study Hours:</b>	4
<b>Total Course Hours:</b>	108
<b>Course Units:</b>	3
<b>Grading Method:</b>	Letter Grade and Pass/No Pass
<b>Credit Status:</b>	Credit, degree applicable
<b>Transfer CSU:</b>	Yes
<b>Effective Date:</b>	Prior to July 1992
<b>Transfer UC:</b>	No
<b>Effective Date:</b>	
<b>General Education:</b>	
<b>ECC</b>	
<b>Term:</b>	
<b>Other:</b>	
<b>CSU GE:</b>	
<b>Term:</b>	
<b>Other:</b>	
<b>IGETC:</b>	

<b>Term:</b>	
<b>Other:</b>	
<b>Student Learning Outcomes:</b>	<p><b>SLO #1 HSS Cutting Speed and Mill Diameter</b></p> <p>Student will calculate the correct rotations per minute (rpm) for a high speed steel end mill using the correct cutting speed and end mill diameter.</p> <p><b>SLO #2 Tool Selection &amp; Use</b></p> <p>Using proper safety procedures and precautions, students will be able to select correct metal working hand tools, measure and layout, utilizing semi-precision and precision measuring tools, and produce projects or exercises within the tolerances specified on engineering drawings.</p> <p><b>SLO #3 Casting, Welding &amp; Cutting</b></p> <p>Using proper safety procedures and precautions, students will be able to operate foundry equipment to produce aluminum castings and to operate welding equipment to braze, weld and cut materials to produce projects within tolerances specified on engineering drawings.</p>
<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>1. Ability to incorporate safety concepts into regular metal working processes.</li> <li>2. Select metal working hand tools to produce projects or exercises within the tolerances specified on engineering drawings.</li> <li>3. Measure and layout, utilizing semi-precision and precision measuring tools to produce and inspect projects or exercises within the tolerances specified on engineering drawings.</li> <li>4. Set up and operate power saws, drilling machines, lathes, grinding machines and milling machines to perform machine tool operations on projects or exercises within the tolerances specified on engineering drawings.</li> <li>5. Set up and operate shears, notchers, bar folders, box and pan breaks, spot welders, Whitney punches, and use pop rivets, tinnern rivets and soft solder to produce sheet metal projects within the tolerances specified on engineering drawings.</li> <li>6. Operate foundry equipment to produce aluminum castings within the tolerances specified on engineering drawings.</li> <li>7. Operate welding equipment to braze, weld and cut materials to produce projects within tolerances specified on engineering drawings.</li> </ol>
<b>Major Topics:</b>	<p><b>I. OVERVIEW OF GENERAL METALS (4 hours, lecture)</b></p> <ol style="list-style-type: none"> <li>1. <ol style="list-style-type: none"> <li>A. Introduction to metal shop</li> <li>B. General safety requirements</li> </ol> </li> </ol>

- C. Specific safety requirements

## **II. OVERVIEW OF GENERAL METALS (8 hours, lab)**

- 1.
  - A. Introduction to metal shop
  - B. General safety requirements
  - C. Specific safety requirements

## **III. SAFETY (4 hours, lecture)**

- 1.
  - A. Oxy acetylene welding
  - B. Introduction - basic welds - electric arc welding applications

## **IV. SAFETY (8 hours, lab)**

- 1.
  - A. Oxy acetylene welding
  - B. Introduction - basic welds - electric arc welding applications

## **V. BENCH METAL (4 hours, lecture)**

- 1.
  - A. Introduction and application
  - B. Projects
  - C. Measuring instruments

## **VI. BENCH METAL (8 hours, lab)**

- 1.
  - A. Introduction and application
  - B. Projects
  - C. Measuring instruments

## **VII. MACHINE TOOLS (4 hours, lecture)**

- A. Lathe - operation and application
- B. Drill press - operation and application
- C. Milling machine - operation and application
- D. Power saws - operation and application

## **VIII. MACHINE TOOLS (8 hours, lab)**

- A. Lathe - operation and application
- B. Drill press - operation and application
- C. Milling machine - operation and application
- D. Power saws - operation and application

## **IX. FOUNDRY (4 hours, lecture)**

- 1.

- A. Principles of casting and patterns
- B. Types of patterns

**X. FOUNDRY (8 hours, lab)**

- 1.
  - A. Principles of casting and patterns
  - B. Types of patterns

**XI. SHEET METAL (4 hours, lecture)**

- 1.
  - A. Tools
  - B. Equipment
  - C. Procedures

**XII. SHEET METAL (8 hours, lab)**

- 1.
  - A. Tools
  - B. Equipment
  - C. Procedures

**XIII. METALLURGY OF STEEL AND FERROUS ALLOYS (4 hours, lecture)**

- 1.
  - A. Processing
  - B. Testing
  - C. Uses

**XIV. METALLURGY OF STEEL AND FERROUS ALLOYS (8 hours, lab)**

- A. Processing
- B. Testing
- C. Uses

**XV. METALLURGY OF NON-FERROUS ALLOYS (4 hours, lecture)**

- 1.
  - A. Processing
  - B. Testing
  - C. Uses

**XVI. METALLURGY OF NON-FERROUS ALLOYS (8 hours, lab)**

- 1.
  - A. Processing
  - B. Testing
  - C. Uses

**XVII. FEEDS AND SPEEDS (4 hours, lecture)**

	<ol style="list-style-type: none"> <li>1. <ol style="list-style-type: none"> <li>A. Cutting tools</li> <li>B. Lubricants</li> </ol> </li> </ol> <p><b>XVIII. FEEDS AND SPEEDS (8 hours, lab)</b></p> <ol style="list-style-type: none"> <li>1. <ol style="list-style-type: none"> <li>A. Cutting tools</li> <li>B. Lubricants</li> </ol> </li> </ol>
<b>Total Lecture Hours:</b>	36
<b>Total Laboratory Hours:</b>	72
<b>Total Hours:</b>	108
<b>Primary Method of Evaluation:</b>	3) Skills demonstration
<b>Typical Assignment Using Primary Method of Evaluation:</b>	Layout and fabricate a parallel line development sheet metal project within the tolerances specified on engineering drawings. Complete a sketch, one-page Bill of Materials, bend allowance calculation, one-page written procedures, and one-page written inspection report and submit to the instructor.
<b>Critical Thinking Assignment 1:</b>	Write a complete one-to-five page process plan to produce a workpiece on an engine lathe within the tolerance specified on engineering drawings incorporating the following operations: face, turn, drill, knurl, thread, part off and inspect. Submit process plan to the instructor.
<b>Critical Thinking Assignment 2:</b>	<p>An engine lathe is to be set-up for turning a 1.375 inches in diameter piece of cold roll steel. Answer the following questions in a one-page lab report showing your work and submit to the instructor:</p> <ol style="list-style-type: none"> <li>1. What is the cutting speed and feed per revolution for cold roll steel?</li> <li>2. What are the formulas for calculating Revolutions Per Minute (RPM) and determining feed rates for Inches Per Revolution (IPR) for engine lathes.</li> <li>3. What is the calculated RPM and feed for the above examples?</li> </ol>
<b>Other Evaluation Methods:</b>	Performance exams Other exams Quizzes Class Performance Homework Problems Multiple Choice Completion Matching Items

	True/False Other: Lab Work Assignments
<b>Instructional Methods:</b>	Demonstration Laboratory Lecture Multimedia presentations
<b>If other:</b>	Homework assignments
<b>Work Outside of Class:</b>	Study Answer questions Required reading
<b>If Other:</b>	1. Manufacturing procedures development/planning 2. Required notebook
<b>Up-To-Date Representative Textbooks:</b>	John R. Walker. <u>MODERN METALWORKING</u> . 10 <sup>th</sup> edition, Goodheart Wilcox, 2018
<b>Alternative Textbooks:</b>	
<b>Required Supplementary Readings:</b>	
<b>Other Required Materials:</b>	Notebook Apron/shop coat Safety glasses Materials for projects
<b>Requisite:</b>	
<b>Category:</b>	
<b>Requisite course(s): List both prerequisites and corequisites in this box.</b>	
<b>Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).</b>	
<b>Requisite Skill:</b>	

<b>Requisite Skill and Matching Skill(s): Bold the requisite skill(s). If applicable</b>	
<b>Requisite course:</b>	
<b>Requisite and Matching skill(s):Bold the requisite skill. List the corresponding course objective under each skill(s).</b>	
<b>Requisite Skill:</b>	
<b>Requisite Skill and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s). If applicable</b>	
<b>Enrollment Limitations and Category:</b>	
<b>Enrollment Limitations Impact:</b>	
<b>Course Created by:</b>	Les Golgart
<b>Date:</b>	09/01/1968
<b>Original Board Approval Date:</b>	
<b>Last Reviewed and/or Revised by:</b>	Eric Carlon
<b>Date:</b>	03/02/2022
<b>Last Board Approval Date:</b>	04/18/2022