

MACH 51.1B Course Outline as of Fall 2022**CATALOG INFORMATION**

Dept and Nbr: MACH 51.1B Title: ADV MACHINE TOOL TECH

Full Title: Advanced Machine Tool Technology

Last Reviewed: 2/28/2022

| Units | | Course Hours per Week | | Nbr of Weeks | Course Hours Total | |
|---------|------|-----------------------|------|--------------|--------------------|-------|
| Maximum | 3.00 | Lecture Scheduled | 2.25 | 17.5 | Lecture Scheduled | 39.38 |
| Minimum | 3.00 | Lab Scheduled | 2.25 | 8 | Lab Scheduled | 39.38 |
| | | Contact DHR | 0 | | Contact DHR | 0 |
| | | Contact Total | 4.50 | | Contact Total | 78.75 |
| | | Non-contact DHR | 0 | | Non-contact DHR | 0 |

Total Out of Class Hours: 78.75

Total Student Learning Hours: 157.50

Title 5 Category: AA Degree Applicable

Grading: Grade Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly: MACH 51B

Catalog Description:

Students will explore advanced machining processes involving the use and maintenance of lathe, mill, drill press, lasers, and common hand tools. Students will also engage in measurement, layout, and tolerance application processes relevant to industrial manufacturing. This course provides project-based learning using multiple machining operations and multiple-part assemblies; more in-depth coverage of properties of materials and Geometric Dimensioning and Tolerancing, including the development of inspection gages. Solid modeling development using Computer-Aided Design (CAD) software and print creation.

Prerequisites/Corequisites:

Course completion of MACH 51.1A

Recommended Preparation:

Eligibility for ENGL 100 or ESL 100

Limits on Enrollment:**Schedule of Classes Information:**

Description: Students will explore advanced machining processes involving the use and maintenance of lathe, mill, drill press, lasers, and common hand tools. Students will also engage

in measurement, layout, and tolerance application processes relevant to industrial manufacturing. This course provides project-based learning using multiple machining operations and multiple-part assemblies; more in-depth coverage of properties of materials and Geometric Dimensioning and Tolerancing, including the development of inspection gages. Solid modeling development using Computer-Aided Design (CAD) software and print creation. (Grade Only)

Prerequisites/Corequisites: Course completion of MACH 51.1A

Recommended: Eligibility for ENGL 100 or ESL 100

Limits on Enrollment:

Transfer Credit: CSU;

Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

| | | | |
|----------------------|----------------------|----------------------|-----------|
| AS Degree: | Area | Effective: | Inactive: |
| CSU GE: | Transfer Area | Effective: | Inactive: |
| IGETC: | Transfer Area | Effective: | Inactive: |
| CSU Transfer: | Transferable | Effective: Fall 1981 | Inactive: |
| UC Transfer: | | Effective: | Inactive: |

CID:

Certificate/Major Applicable:

Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:

At the conclusion of this course, the student should be able to:

1. Calculate speeds and feeds to machine of ferrous and non-ferrous metals.
2. Setup and cut an angle on a sine plate.
3. Manufacture precision layout and machining of a part according to engineering drawing tolerances and specifications on a vertical mill.

Objectives:

At the conclusion of this course, the student should be able to:

1. Safely operate a variety of machine tools without supervision.
2. Set up machines and produce machine parts independently.
3. Calculate speeds, feeds, and revolutions per minute (RPM) for machining various metals.
4. Perform precision layouts using metrology layout tools.
5. Calculate and cut angles.
6. Determine tolerances according to manufacturing standards.
7. Manufacture and "finish" a machined part according to engineering drawing specifications.
8. Identify and locate information in text manuals used in industry.
9. Demonstrate proper safety practices, procedures, and professionalism.

Topics and Scope:

- I. Orientation and Safety

- II. Materials and Processes
 - A. Ferrous metals
 - B. Non-ferrous metals
- III. Material Calculation Formulas
 - A. Feeds
 - B. Speeds
 - C. RPM
- IV. Advanced Lathe Operations
 - A. Cutting angles
 - B. Producing a knurl
 - C. Boring
 - D. Work Holding Devices
- V. Tooling: Use, Care, and Identification
 - A. Types
 - B. Coolants
- VI. Metrology Layout Tools
 - A. Sine bar
 - B. Protractors
 - C. Gages
 - D. Optical alignment magnifier
- VII. Drill Press Operations
 - A. Tools
 - B. Proper set-up procedures
- VIII. Cutting Tools
 - A. Types
 - B. Calculations
- IX. Advance Mill Operations
 - A. Surface finish
 - B. Tolerances
 - C. Work Holding Devices
- X. Geometric Dimensioning and Tolerances (G.D.& T.)
 - A. Tolerance applications
 - B. Allowances
 - C. Precise fitting
 - D. Manufacturing standards
- XI. Industrial Text Manuals
 - A. "Machinery's Handbook" machinist reference handbook
 - B. Online research
- XII. Metrics
 - A. Application
 - B. Use of conversion tables used in industry
- XIII. Professionalism
 - A. Safety
 - B. Production quality
 - C. Proper work habits

All topics are covered in the lecture and lab portions of the course.

Assignment:

Lecture-related Assignments:

1. Weekly readings (15–20 pages)

2. Weekly quizzes
3. Safety exam
4. Midterm
5. Final exam

Lab-related Assignments:

1. Lab projects (4-6)
2. Lab documentation (course notes, handouts, process plans and inspection sheets)
3. Organize workspace and clean-up lab area (professionalism)

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

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| Lab documentation | Writing 10 - 20% |
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Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

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| Lab projects, lab documentation | Problem solving 10 - 20% |
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Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

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| Lab projects | Skill Demonstrations 20 - 35% |
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Exams: All forms of formal testing, other than skill performance exams.

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| Safety exam, quizzes, midterm, and final exam | Exams 20 - 30% |
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Other: Includes any assessment tools that do not logically fit into the above categories.

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| Professionalism, participation, organization and clean-up | Other Category 10 - 20% |
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Representative Textbooks and Materials:

Precision Machining Technology. 3rd ed. Hoffman, Peter and Hopewell, Eric. Cengage. 2019
Instructor prepared materials