

**MACH 51B Course Outline as of Fall 2004****CATALOG INFORMATION**

Dept and Nbr: MACH 51B Title: ADV MACHINE TOOL TECH

Full Title: Advanced Machine Tool Technology

Last Reviewed: 8/27/2018

| Units   | Course Hours per Week |                   | Nbr of Weeks |      | Course Hours Total |       |
|---------|-----------------------|-------------------|--------------|------|--------------------|-------|
| Maximum | 2.00                  | Lecture Scheduled | 1.00         | 17.5 | Lecture Scheduled  | 17.50 |
| Minimum | 2.00                  | Lab Scheduled     | 3.00         | 8    | Lab Scheduled      | 52.50 |
|         |                       | Contact DHR       | 0            |      | Contact DHR        | 0     |
|         |                       | Contact Total     | 4.00         |      | Contact Total      | 70.00 |
|         |                       | Non-contact DHR   | 0            |      | Non-contact DHR    | 0     |

Total Out of Class Hours: 35.00

Total Student Learning Hours: 105.00

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:

**Catalog Description:**

Advanced machining processes involving the use and care of lathe, mill, drill, drill press, and common hand tools. Measurement, layout and heat treatment of metal. Application of processes in manufacturing and industry.

**Prerequisites/Corequisites:**

Course Completion of MACH 51A

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

Description: Advanced machining processes involving the use and care of lathe, mill, drill, drill press, and common hand tools. Measurement, layout and heat treatment of metal. Application of processes in manufacturing and industry. (Grade Only)

Prerequisites/Corequisites: Course Completion of MACH 51A

Recommended:

Limits on Enrollment:

Transfer Credit: CSU;

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

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

|                   |                      |            |           |
|-------------------|----------------------|------------|-----------|
| <b>AS Degree:</b> | <b>Area</b>          | Effective: | Inactive: |
| <b>CSU GE:</b>    | <b>Transfer Area</b> | Effective: | Inactive: |

|               |                      |            |           |
|---------------|----------------------|------------|-----------|
| <b>IGETC:</b> | <b>Transfer Area</b> | Effective: | Inactive: |
|---------------|----------------------|------------|-----------|

|                      |              |            |           |           |
|----------------------|--------------|------------|-----------|-----------|
| <b>CSU Transfer:</b> | Transferable | Effective: | Fall 1981 | Inactive: |
|----------------------|--------------|------------|-----------|-----------|

|                     |  |            |  |           |
|---------------------|--|------------|--|-----------|
| <b>UC Transfer:</b> |  | Effective: |  | Inactive: |
|---------------------|--|------------|--|-----------|

**CID:**

**Certificate/Major Applicable:**

Certificate Applicable Course

## **COURSE CONTENT**

### **Outcomes and Objectives:**

Upon successful completion of this course, the student will 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 R.P.M.s for machining various metals.
4. Perform precision layouts using metrology layout tools.
5. Calculate and cut tapers and angles.
6. Determine tolerances according to manufacturing standards.
7. Measure, layout, and heat treat metal for fabrication.
8. Produce a machine or tool part per a blueprint.
9. "Finish" a part according to print-specified level.
10. Make calculations for gear production.
11. Measure and inspect gears.
12. Identify and locate information in text manuals used in industry.
13. Demonstrate professionalism in shop practices and procedures.

### **Topics and Scope:**

- I. Orientation and Safety
- II. Materials and Processes
  - A. Ferrous metals
  - B. Non-ferrous metals
- III. Calculations for Various Metals
  - A. Feeds
  - B. Speeds
  - C. R.P.M. (revolutions per minute)
- IV. Metrology Layout Tools
  - A. Sine bars
  - B. Ball bar
  - C. Protractors

- D. Vernier height gages
- E. Surface gauge
- F. Optical alignment magnifier
- V. Drills and Drilling Operations and Set-ups
  - A. CSK (counter-sinks)
  - B. Reams
  - C. Taps and tap heads
- VI. Advanced Lathe Operations
  - A. Cutting tapers
  - B. Cutting angles
  - C. Chamfers
- VII. Work Holding Devices Used on Lathes
  - A. 4-jaw chucks
  - B. Faces plates
  - C. Collet chucks
  - D. Turret lathes
- VIII. Tool Use, Care, and Identification
  - A. Ceramic cutting tools
  - B. Carbide tooling and tool steels
  - C. Form Tools
  - D. Coolants
  - E. Cutting fluids
- IX. Cutting Tools
  - A. Broaches
  - B. Slotters
  - C. Key way cutters
  - D. Calculations
- X. Mill Machine Characterization
  - A. Accurate machining surfaces
  - B. Finishes
  - C. Limited tolerances
- XI. G.D.T. (geometric dimensioning and tolerances)
  - A. Applications for tolerances
  - B. Allowances
  - C. Precise fitting
  - D. Manufacturing standards
- XII. Abrasives
  - A. Honing
  - B. Capping
  - C. Grinding
  - D. Microfinishes
  - E. Identifying finishes
  - F. Levels of required finishes per print
- XIII. Use and Care of Gear Cutting Machines and Cutters
  - A. Gear terminology
  - B. Calculations for gear production
  - C. Measurement and inspection of gears
  - D. Identifying wear
  - E. Maintaining accuracy of gear components
    - 1. in production
    - 2. in use
- XIV. Use and Care of Text Manuals Used in Industry

- A. Machinery handbooks
- B. ASTM (American Standards and Testing of Materials)
- C. A.S.M. (American Standards of Materials)

XV. Metrics

- A. Application
- B. Use of conversion tables used in industry

XVI. Professionalism

**Assignment:**

Assignments may include:

1. Readings in assigned text, approximately 15-20 pages per week.
2. Lab projects will be graded for skill demonstration and problem solving and may include:
  - a) Calculations of speeds and feeds.
  - b) Cut taper, angles, and chamfers.
  - c) Cut a Morris taper and verify angles with a sine bar and dial indicator.
  - d) Produce a gear from a blank.
  - e) Cut internal threads on a lathe using a boring bar.
3. Compile a notebook of lab notes and handouts.
4. Organize workspace and clean up lab area.
5. Quizzes, mid-term and final objective and performance exams.

**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.

|   |                     |
|---|---------------------|
| Compile a notebook of lab notes and handouts. | Writing<br>10 - 20% |
|---|---------------------|

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

|               |                             |
|---------------|-----------------------------|
| Lab projects. | Problem solving<br>20 - 30% |
|---------------|-----------------------------|

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

|                                       |                                  |
|---------------------------------------|----------------------------------|
| Class performances, Performance exams | Skill Demonstrations<br>20 - 30% |
|---------------------------------------|----------------------------------|

**Exams:** All forms of formal testing, other than skill performance exams.

|   |                   |
|---|-------------------|
| Multiple choice, True/false, Matching items, Completion | Exams<br>20 - 30% |
|---|-------------------|

**Other:** Includes any assessment tools that do not logically fit into the above categories.

Participation, preparation, work habits , attitude.

Other Category  
0 - 10%

**Representative Textbooks and Materials:**

MACHINE TOOL PRACTICES, Richard Kibbe et al. Prentice Hall, 2003.