



COURSE OUTLINE

Course Number AMT 110	Course Title Machine shop techniques II	Credits 3
Hours: Lecture/lab 2/3	Co-or Pre-requisite AMT101	Implementation Fall 2022

Catalogue Description

Introduces students to the theory and practical concepts of manual machining. Topics include: machine shop safety, turning machines, vertical milling machines, grinding and abrasive machining processes. Corresponding labs reinforce lectures with practical examples which follow NIMS certification requirements.

General Education

Category:
Not GenEd

Course coordinator:

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Required Text: **Machinery's Handbook**

By Erik Oberg and Franklin D. Jones

Publisher: Industrial Press

ISBN-10: 083112900X ISBN-13: 978-0-8311-2900-2

Optional Text: **Machine Tool Practices**

By Richard Kibbe

Publisher: Pearson

Student Learning Outcomes (SLO):

Students will be able to:

1. Demonstrate safe work habits while operating turning machines. **(ILG 3,4,10, 11 PLO,5,10)**
2. Identify and explain the function of engine lathe parts. **(ILG 3,4,10, 11 PLO,5,10)**
3. Safely operate and perform the procedures for drilling, boring, reaming, knurling, recessing, parting, and tapping in the lathe. **(ILG 3,4,11) (PLO 2,3,4,5,10)**
4. Identify and describe the important components and controls on the horizontal and vertical milling machine. **(ILG 3,4) (PLO 5,10)**
5. Safely operate the milling machine and perform (face milling, grooving, drilling). **(ILG 3,4,11) (PLO 2,3,4,5,10)**
6. Use industry reference materials for material compositions and machining calculations (speeds, feeds and power). **(ILG 2,10,11) (PLO 3,10)**

Institutional Learning Goals (ILG)

Institutional Learning Goal 2 Mathematics: Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

Institutional Learning Goal 3 Science: Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.

Institutional Learning Goal 4 Technology: Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

Institutional Learning Goal 10 Information Literacy: Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.

Institutional Learning Goal 11 Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Program Learning Outcomes (PLO)

1. Maintain a safe and organized workspace.
2. Interpret blueprints to manufacture parts.
3. Apply shop and tool room mathematics as needed.
4. Complete part inspection using instruments such as micrometers, calipers, and scales.
5. Set up and operate a (drill press, lathe, milling machine, grinder, press brake).
6. Set up and operate CNC machines (lathe and mill).
7. Use NC programming (G and M codes) to control movement and cutting processes.
8. Understanding of statistical quality control.
9. Pursue NIMS certification.

Unit Objectives

Unit I Safety Review (SLO 1)

The student will be able to:

1. Identify common industrial safety issues and hazards.
2. Select and use personal machine shop safety equipment.

Unit II Lathing (SLO 2,3,6)

The student will be able to:

1. Demonstrate safe work habits while operating turning machines.
2. Identify and explain the function of engine lathe parts.
3. Identify places where an engine lathe should be lubricated.
4. Make common adjustments such as cross slide, compound slide, and tailstock.
5. Identify standard, quick-change, and turret-type toolholders mounted on a lathe carriage.
6. Identify tool holding devices for the lathe tailstock.
7. Explain the purpose of rake and relief angles, chip breakers, and form tools.
8. Explain the uses and care of independent and universal chucks.
9. Explain the limitations and advantages of collets and describe a collet setup.
10. Explain the use of a face driver or drive center.
11. Explain the uses and differences between drive plates and face plates.
12. Explain drives and shifting procedures for changing speeds on lathes.
13. Describe the use of various feed control levers.
14. Explain the relationship between longitudinal feeds and cross feeds.
15. State the differences in types of cross-feed screw micrometer collars.
16. Correctly set up a workpiece and face the ends.
17. Correctly center drill the ends of a workpiece.
18. Determine the proper feeds and speeds for a workpiece.
19. Explain how to set up for make facing cuts at a given depth and how to measure them.
20. Explain the procedures for drilling, boring, reaming, knurling, recessing, parting, and tapping in the lathe.

21. Set up to drill, ream, bore and tap on the lathe and complete each of these operations.

Unit III Milling machine (SLO 4,5,6)

The student will be able to:

1. Identify the important components and controls on the horizontal milling machine.
2. Describe the functions of machine parts and controls.
3. Identify machine spindles and set up different cutting tool mounting systems used to drive milling cutters.
4. Select a work holding method and device for common milling tasks.
5. Select speeds and feeds for several different materials and milling cutters.
6. Set up the mill for plain milling.
7. Select and set up a work holding system.
8. Select and set up an appropriate cutter and arbor.
9. Mill surfaces flat and square to each other.

Method of Instruction

Learning will take place via classroom instruction, demonstrations, and student activities, as well as through textbook reading and homework assignments. Lab activities will augment this. Use of equipment and manual skills will be developed in the lab.

Student Evaluation

Students' achievement of the course objectives will be evaluated through the use of the following:

- Three unit tests assessing students' comprehension of terminology, calculations and practices related to the unit objectives.
- Lab grade based on shop projects and lab assignment results.
- In class participation, homework and attendance.

Evaluation Tools	Percentage of Grade
3 Unit Tests	50%
Lab Assignments/ Shop Projects	25%
Homework / In-Class Assignments	25%
Total	100%