

Clackamas Community College

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Section #1 General Course Information**Department:**Manufacturing**Submitter**

First Name: Mark

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Course Prefix and Number:MFG - 111

Credits:9**Contact hours**

Lecture (# of hours):

Lec/lab (# of hours): 198

Lab (# of hours):

Total course hours: 198

For each credit, the student will be expected to spend, on average, 3 hours per week in combination of in-class and out-of-class activity.

Course Title:Machine Tool Fundamentals I**Course Description:**

This course is an introduction to machine tool operation, precision measurement and engineering drawings: covers machine tool operations including drill presses, lathes and milling machines. Includes internal and external threading.

Type of Course:Career Technical Preparatory

Is this class challengeable?

Yes

Can this course be repeated for credit in a degree?

No

Is general education certification being sought at this time?

No

Does this course map to any general education outcome(s)?

No

Is this course part of an AAS or related certificate of completion?

Yes

Name of degree(s) and/or certificate(s):Manufacturing Programs

Are there prerequisites to this course?

No

Are there corequisites to this course?

No

Are there any requirements or recommendations for students taken this course?

Yes

Recommendations:Completion of MFG-104 & MFG-107

Requirements:None

Are there similar courses existing in other programs or disciplines at CCC?

No

Will this class use library resources?

No

Is there any other potential impact on another department?

No

Does this course belong on the Related Instruction list?

No

GRADING METHOD:

A-F or Pass/No Pass

Audit:Yes

When do you plan to offer this course?

✓ Fall

✓ Winter

✓ Spring

Is this course equivalent to another?

If yes, they must have the same description and outcomes.

No

Will this course appear in the college catalog?

Yes

Will this course appear in the schedule?

Yes

Student Learning Outcomes:

Upon successful completion of this course, students should be able to:

3 credits:

1. identify various types of eye protection to be worn in the shop,
2. identify the need for and various types of hearing protection,
3. identify various types of materials that can potentially give off hazardous fumes,
4. calculate the correct rpm for a lathe, milling machine or drill press;
5. calculate the correct feed rate for a milling cutter,
6. measure a part using either a fractional, decimal or metric steel rule;
7. describe how to correctly handle and take care of a steel rule,
8. measure a part using a Vernier, dial or digital caliper;
9. read outside, inside or depth micrometers;
10. correctly handle and use a variety of micrometer measuring instruments,
11. describe what a comparison measuring instrument is and how to use it,
12. describe the major components of a lathe and their function in its operation,
13. describe the different types of tool holders used on a lathe,
14. name the advantages and disadvantages of using high speed steel cutting tools,
15. describe what a form tool is and how it is used on a lathe,
16. name the different types of chucks used on a lathe,
17. name the advantages and disadvantages of a 3-jaw and 4-jaw chuck,
18. describe the advantages and limitations of using collets on a lathe,
19. describe how face plates and drive plates are used on the lathe.

6 credits:

1. explain how speed changes are made on gear head lathes,
2. describe when and how the carriage feed handle hand wheel should be used,
3. what the half-nut is on a lathe, and when it should and should not be used;
4. describe various methods of dialing in a 4-jaw chuck,
5. describe what center drilling is, the causes of and how to prevent center drill breakage;
6. explain the difference between the pitch and lead of a thread,
7. calculate how far to feed a threading in to cut a thread to the correct depth,
8. explain the difference between the fit and percentage of a thread,
9. describe the steps needed to cut a thread,
10. explain how to align a thread cutting tool on a lathe to the part being threaded,
11. inspect a thread to determine its size,
12. describe at least three different types of drilling machines,
13. explain where high helix drills are used,
14. explain what a tap drill is and when it is used,
15. describe how to measure a drill to determine its correct diameter,
16. explain what a drill drift, drill sleeve and drill socket is and where they are used;
17. describe how a twist drill is ground on a pedestal grinder by hand,
18. explain the importance of correct cutting lip length and angle when sharpening a twist drill by hand or machine,
19. explain the importance of a correct and safe setup whenever operating a drilling machine,

20. explain the importance of controlling the feed rate of a twist drill,
21. demonstrate the correct clamping procedures on the drilling machine,
22. describe when and how to use parallel bars on drilling setups,
23. explain the importance in starting a tap in a drill press,
24. explain the applications and differences between countersinking, Counterboring and spotfacing;
25. explain what a ream is and how it differs from a drill,
26. determine the correct material allowance for different size reams and materials,
27. determine the correct feed rate and rpm for a given reaming operation,
28. explain the correct type and application of cutting fluids when reaming,
29. identify some common problems associated with reaming.

9 credits:

1. describe safe setup and operating procedures when using the horizontal or vertical band saw,
2. describe a variety of saws used in industry,
3. explain the advantages and disadvantages of the various types of saws used by industry,
4. describe the conditions that define blade selection on a horizontal band saw,
5. explain what set is on a saw blade and why it is necessary,
6. name the advantages and disadvantages of an abrasive saw,
7. name the applications that an abrasive saw would be best suited for,
8. describe the function of the band saw blade guide on a vertical or horizontal band saw,
9. describe how band tracking is adjusted on a vertical band saw,
10. explain what a tap is and how it is used to cut internal threads,
11. use a tap drill chart to identify and select the correct size tap drill of a given tapping operation,
12. determine how deep should usable threads be in a hole of a given size,
13. name some of the various causes for broken taps,
14. describe the various methods of removing a broken tap from a part,
15. describe what a die is, where and how it is used to cut external threads;
16. state what the diameter a piece of material should be before having threads cut on it with a die,
17. why a rod should be chamfered before being threaded with a die,
18. describe the primary function of a pedestal grinder,
19. explain why pedestal grinders should not be used for rough grinding,
20. name at least three safety factors to remember when using the pedestal grinder.

This course does not include assessable General Education outcomes.

Major Topic Outline:

1. 3 Credit:
 - a. Shop safety.
 - b. Lathe, milling machine and drill press rpm calculations.
 - c. Milling cutter rpm and feed rate calculations.
 - d. Inch/millimeter conversions.
 - e. The correct applications, reading, handling and storage of steel rules.
 - f. How to read and measure parts with a Vernier, dial or digital caliper.
 - g. Application and reading outside, inside and depth micrometers.
 - h. Application of small hole gages, telescoping gages and parallel bars.
 - i. Manual lathe use and application.
 - j. Lathe controls and their function.
 - k. Commonly used tool holders for lathes.
 - l. Commonly used cutting tool for the lathe.
 - m. Use of 3 & 4-jaw chucks on the lathe.
 - n. Collets, face plates and drive plates for the lathe.
2. 6 Credit:
 - a. Operation of the various lathe controls.
 - b. Facing and center drilling on the lathe
 - c. Sixty-degree thread calculations.
 - d. The setup and cutting of a sixty-degree external thread.
 - e. In process inspection or Inspection of a completed sixty-degree external thread.
 - f. The calculations for the cutting of a sixty-degree internal thread.
 - g. The setting up and cutting of a sixty-degree internal thread.

- h. In process inspection or Inspection of a completed sixty-degree internal thread.
 - i. The various types of drilling machines used by industry.
 - j. The various types of drills used by industry.
 - k. The hand grinding of a twist drill.
 - l. The correct setup and operation of a drilling machine.
 - m. The corrects application, setup and use of Counterboring, countersinking and spotfacing tools.
3. 9 Credit:
- a. The various types of saws used by industry.
 - b. Safe setup and operation of the horizontal and vertical band saws.
 - c. Applications and advantages and disadvantages of the abrasive saw.
 - d. How to prepare to setup and use the vertical band saw.
 - e. Using the vertical band saw.
 - f. Taps and tapping applications.
 - g. Correct tapping methods.
 - h. Reducing tap breakage and broken tap removal.
 - i. Types and application of thread cutting dies.
 - j. Shaft size prior the thread cutting with a die.
 - k. Applications of pedestal grinders in the machine shop.
 - l. Pedestal grinder safety.

Does the content of this class relate to job skills in any of the following areas:

- | | |
|--------------------------------------|-----------|
| 1. Increased energy efficiency | No |
| 2. Produce renewable energy | No |
| 3. Prevent environmental degradation | No |
| 4. Clean up natural environment | No |
| 5. Supports green services | No |

Percent of course:0%

First term to be offered:

Next available term after approval

:
