Clackamas Community College

Online Course/Outline Submission System

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Section #1 General Course Information

Department: Manufacturing

Submitter

First Name: Mark
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Course Prefix and Number: MFG - 112

 # 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 II

Course Description:

This course is a continuation of machine tool operations. Covers set-up and operation of the vertical milling machine and boring techniques on the lathe. Includes surface grinding, selection of abrasive wheels.

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-111

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:No

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 the basic geometric dimensioning & tolerancing symbols relevant to machining projects,
2. describe how a positive or negative tool rake may affect the surface finish of a piece of material,
3. describe relationsship between high speed steel, carbide and the surface finishes obtained at different surface feet per minute speeds;
4. describe the two basic functions of cutting fluids,
5. identify four different types of cutting fluids,
6. describe the basic advantages of carbide cutting tools over that of high speed steel,
7. identify some of the variables to consider when selecting a carbide cutting tool,
8. describe the advantages and disadvantages of turning a part between centers,
9. name the various types of centers used in a lathe tailstock,
10. state how much material should be left on a part for a finish cut,
11. describe the result when on the work piece when the lathes centers are out of alignment,
12. name three method of aligning the centers on a lathe,
13. explain the chief advantage of boring over reaming in a lathe,
14. list five ways to eliminate chatter in a boring bar,
15. describe the rpm that a ream should rotate at,
16. describe how fast a ream should be feed into a piece of material,
17. describe how to eliminate chatter when parting off a piece of material in a lathe,
18. explain how to eliminate the problem of double impressions when knurling,
19. explain how to avoid producing a knurl where the metal is flaking off.

6 credits:
1. describe when a steady rest should be used on a lathe,
2. describe when a follow rest should be used on a lathe,
3. explain howa steady rest can be dialed in with a dial indicator,
4. explain how a steady rest can be used on a piece of square or rectangular material,
5. name five different types of translating screw threads,
6. give the included angle of an acme thread,
7. calculate the correct depth of an external acme thread,
8. define the pitch of a thread,
9. define the lead of a thread,
10. describe what a multiple lead thread is,
11. name three advantages of a multiple lead thread,
12. name the types of threads that can be produced as a multiple lead,
13. identify and explain the function of each the major components of the vertical milling machine,
14. correctly identify a variety of milling cutters used on the vertical milling machine and the application of where it should be used,
15. describe how to correctly setup a part on the vertical milling machine and describe the related tooling such a vices, parallel bars, screw jacks, hold down clamps associated with the setup;
16. calculate the correct rpm and feed rate for a milling cutter,

17. explain the differences, advantages and disadvantages between conventional and climb milling,
9 credits:
1. name some of the commonly used materials used to produce grinding wheels,
2. identify some of most basic wheel symbols specification used to specify information about grinding wheels,
3. name some of the “variable” factors that need to considered when selecting a grinding wheel,
4. describe what dressing a grinding wheel is and what it does for the grinding wheel,
5. describe what truing a grinding is and what it does for the grinding wheel,
6. describe the position of the grinding wheel dresser with regards to the grinding wheel,
7. describe the advantages of a built-in wheel dresser,
8. describe what a form dresser is and where it would be used,
9. describe how a grinding wheel is balanced,
10. name two types of wheel balancers,
11. name four types of grinding fluids,
12. describe the correct application of a grinding fluid when surface grinding,
13. name at least three methods of filtering waste material from grinding fluids,
14. name the major components of a surface grinder and their function,
15. name the most commonly used work holding device on a surface grinder,
16. name two additional work holding devices used on the surface grinder,
17. explain what is meant by the term “grinding ratio,”
18. describe some of the most common problems associated with surface grinding,
19. explain how to eliminate some of the most common problems associated with surface grinding.

This course does not include assessable General Education outcomes.

Major Topic Outline:

1. 3 Credit:
a. Basic geometric and dimensioning symbols.
b. How metal flow when being cut.
c. The different types of chips produced with a cutting tool.
d. The effect the surface feet per minute has on the materials surface finish.
e. The machinability index of various types of materials.
f. Different types of cutting fluids used by industry.
g. The appropriate application of each of the cutting fluids.
h. Methods of applying cutting fluids.
i. The various methods of filtering cutting fluids.
j. The benefits of filtration and reuse of the cutting fluids.
k. Applications for high speed steel and carbide.
l. Variable factors to consider when selecting a carbide cutting tool.
m. The ASA carbide tool and insert identification system.
n. Appropriate applications for turning a part between centers.
o. Setting up and machining a part between centers.
p. The different types of centers used in the lathes tailstock.
q. Mounting parts on tapered or expanding mandrels.
r. Inspecting a lathe for center misalignment.
s. Alignment of the lathes center.
t. Other lathe operations such as drilling, boring, reaming, tapping, parting off and knurling.
2. 6 Credit:
a. Basic geometric and dimensioning symbols.
b. Applications for using the steady rest on a lathe.
c. Applications for using a follow rest on a lathe.
d. How to correctly setup a steady or follow rest on a lathe.
e. How to center or dial in a steady rest on a lathe.
f. How to setup and turn irregular shaped material in a steady rest.
g. The different types of translating screw threads used by industry.
h. Acme, square, modified square and buttress thread calculations.
i. Understanding the function and application of multiple lead threads.
j. Understanding how to setup and cut a multiple lead external thread.
k. The major components of a knee type vertical milling machine and their function.

l. The various types of milling cutters used on the vertical milling machine.
m. The different types of cutter holders used on the vertical milling machine.
n. How to (square) or dial the head of a vertical milling machine in perpendicular to its table.
o. How to dial a part in so it is parallel or perpendicular to the axis of the table.
p. How to correctly us and edge finder.
q. How to dial in the center of a bore on a part.
r. How to correctly calculating the feed and speed of milling cutters.
s. How to mill out a cavity on a part on the vertical milling machine.
t. The various methods of milling an angle on a part.
u. Applications for using a rotary table or indexing head.
3. 9 Credit:
a. The various types of grinding machines used in industry.
b. The different types of commonly used grinding wheel materials.
c. Review of common grinding wheel specifications.
d. Some of the variable factors to consider when selecting a grinding wheel.
e. The difference between dressing and truing a grinding wheel.
f. When to true and dress a grinding wheel.
g. How to true and dress a grinding wheel.
h. What is form dressing of a grinding wheel, and how it is performed.
i. When does a grinding wheel need to be balanced, and how is it performed.
j. Advantages and disadvantages of the two different types of wheel balancers.
k. The different types of grinding fluids used by industry.
l. The correct application of grinding fluids on grinding wheels.
m. The various methods and benefits of grinding fluid filtration.
n. The major components of the horizontal reciprocating grinder and their function.
o. The most widely used work holding devices for the surface grinder.
p. The difference between electro-permanent magnetic chuck and the permanent magnetic chuck.
q. How to reinstall a magnetic chuck if it has been removed from the surface grinder.
r. What are laminated accessories, and how are they used in work holding on surface grinders.
s. Setups and operations on the surface grinder.
t. The general cause of surface grinding problems.
u. Specific problems and solutions in surface grinding.

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
: