Northwest State Community College  
Course Information Sheet

# Course Information

Title: Principles of Machining B

Course Number: INT 113

Credit Hours: 1

Pre-requisite: INT 112

# Description

This course will focus on the students learning how to utilize a manual machining lathe, and how to use grinders and abrasives for machining. Students will learn the parts and controls on a lathe, as well as the types of tooling used on a lathe, to machine cylindrical types of parts. Surface grinding will also be discussed, as well as the inside and outside type of grinding on a metal part.

# Learning Outcomes

Upon completion of this course the students will be able to:

1. Explain the controls on a manual machining lathe
2. Explain the purpose of 3 & 4 jaw chucks, as well as the lathe tailpiece
3. Secure a workpiece into the chuck of a manual lathe
4. Identify and size drills and taps for machining threads in a workpiece
5. Machine threads in a cylindrical workpiece on a lathe using drill, taps and cutting fluid)
6. Identify the major types of grinding machines (internal, surface, cylindrical, tool & cutter, etc.)
7. Demonstrate the proper way to set up and grind workpiece (cylindrical and surface)
8. Explain how to change and balance a grinding wheel on a grinder

# Required Material

**Text**:

Machining Fundamentals 11th Edition, John R. Walker, ISBN: 978-1-64924-979-0 (Hardcover) or 979-1-63776-200-4 (e-book)

**Supplies**:

Safety glasses

Calculator

# Principles of Machining B Module 1: The Lathe

This module will focus primarily on the lathe, with additional information on off-hand and surface grinders. After this module, you should be able identify the parts and function of a lathe. You should also be able to identify and set up various tooling and work-holding devices and calculate safe speeds. You should be able to safely use a lathe to perform turning and facing operations.

Upon completion of this module the student will be able to:

1. Describe and demonstrate safety devices and best safety practices for lathes.
2. Identify basic parts of a lathe.
3. Describe different workholding methods and demonstrate their use.
4. Identify the properties of various cutting tools.
5. Demonstrate facing, turning, and grooving operations

### Module 1 Activities

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 Read Machining Fundamentals, Chapter 14 - The Lathe

Text Book

 Review the Lathe Safety Reminder handout

<https://ag.purdue.edu/department/fnr/lab-sites/woodresearch/_docs/safelathe.pdf>

 Watch video: Lathe Safety (8:23)

<https://www.youtube.com/watch?v=9QcNzQVVNg8>

 Watch video: Lathe Setup (10:43)

<https://www.youtube.com/watch?v=SOnPEwP9bCA>

 Watch video: Dialing in a 4-Jaw Chuck (6:10)

<https://www.youtube.com/watch?v=vsIaYm7g9nA>

 Watch video: Turning & the Lathe (2:10)

<https://www.youtube.com/watch?v=8EsAxOnzEms>

 Watch video: Basic Turning on a Manual Lathe (5:46)

<https://www.youtube.com/watch?v=Vm5Chb_2JxA>

 Watch video: Working with a Lathe, Part Two (47:02)

<https://www.youtube.com/watch?v=jXET1-g6CJA>

 Complete Quiz 113-1

See Quiz INT113-1 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 113-1.1

See Lab Documents

 Schedule and complete Hands-on Lab 113-1.1

See INT113 1.1 Lab Document

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# Principles of Machining B Module 2: Advanced Lathe Operations

This module will introduce you to more advanced lathe functionality, including cutting tapers, threading, boring, knurling, drilling, and filing. We will also look at additional workholding options, including rests and mandrels.

Upon completion of this module the student will be able to:

1. Describe the processes of boring, drilling, knurling, filing, and grinding a workpiece using a lathe.
2. Calculate the taper ratio and angle.
3. Describe multiple ways to cut a tapered part using a lathe.
4. Describe the steps for cutting threads in a workpiece using a lathe.
5. Machine threads in a workpiece using a lathe.
6. Perform a knurling operation.

### Module 2 Activities

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 Read Machining Fundamentals, Chapter 15 - Other Lathe Operations

Text Book

 Read Machining Fundamentals, Chapter 16 - Cutting Tapers and Screw Threads

Text Book

 Watch video: Turning Tapers (13:46)

<https://www.youtube.com/watch?v=U7hngF1jmyg>

 Watch video: Drilling and Reaming in the Lathe (7:08)

<https://www.youtube.com/watch?v=TYZmOPSbEW4>

 Watch video: Boring Metal Lathe Tutorial (23:46)

<https://www.youtube.com/watch?v=8-ySTD5b7Dw>

 Watch video: How Knurling is done (7:47)

<https://www.youtube.com/watch?v=Ale0rlMDXH4>

 Watch video: Turning Tapers on a Manual Lathe (7:47)

<https://www.youtube.com/watch?v=mK3eXIFKx2s>

 Watch video: Chasing Threads on a Lathe (8:33)

<https://www.youtube.com/watch?v=_cqOBtoRRhI>

 Watch video: Catching up on a thread that was dismounted from the chuck (11:36)

<https://www.youtube.com/watch?v=z-zceSR23H4>

 Optional - Watch video: How to Cut a Fine Thread on a Lathe (Training Film) (11:28)

<https://www.youtube.com/watch?v=90EuSPWkLrY>

 Complete Quiz 113-2

See Quiz INT113-2 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 113-2.1

See Lab Documents

See INT113 2.1 Lab Document

 Schedule and complete Hands-on Lab 113-2.1

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# Principles of Machining B Module 3 - Off-hand and Surface Grinding

This module will introduce off-hand and surface grinding. While both surface grinders and the pedestal grinders used for off-hand grinding operate under the same principles, their usage is very different.

Upon completion of this module the student will be able to:

1. Describe and demonstrate safety practices for using a grinder.
2. Identify types of grinders and their components.
3. Identify types of grinding wheels and dressers
4. Explain how to change and balance a grinding wheel.
5. Demonstrate the process of setting up and grinding a workpiece on a surface grinder and pedestal grinder.

### Module 3 Activities

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 Read Machining Fundamentals, Chapter 13 - Offhand Grinding

Text Book

 Read Machining Fundamentals, Chapter 19 - Precision Grinding

Text Book

 Watch video: Pedestal Grinder Safety (6:25)

<https://www.youtube.com/watch?v=Lo1u4Mwmt3s>

 Watch video: Using a Grinder (3:54)

<https://www.youtube.com/watch?v=PvLfR-wA19U>

 Review article: Choosing the Right Grinding Wheel

By Joe Sullivan, Posted on <www.mmsonline.com>

 Watch video: Surface Grinder Basics (9:07)

<https://www.youtube.com/watch?v=7FwL55ErfDI>

 Complete Quiz 113-3

See Quiz INT113-3 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 113-3.1

See Lab Documents

 Schedule and complete Hands-on Lab 113-3.1

See INT113 3.1 Lab Document

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