Northwest State Community College  
Course Information Sheet

# Course Information

Title: Principles of Machining A

Course Number: INT 112

Credit Hours: 1

Pre-requisite: INT 111

# Description

This course will develop the student’s skills and knowledge in basic machining and metalworking operations. The focus will be on basic job layout and benchwork techniques, that will include tooling, sawing, sanding, drilling and finishing operations, as well as how to utilize measuring instruments.

# Learning Outcomes

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

1. Measure the dimensions of a part using measuring tools found in a machine shop
2. Identify various machine shop cutting and sawing tools used for a specific application
3. Identify the drill bit size required for a specific hole size for tapping or clearance
4. Calculate the cutting feeds and speeds of the drill, based on the workpiece material
5. Drill multiple holes into an aluminum workpiece using a vertical manual drill press
6. Compare various types of sanding paper and polishing cloths used in metal finishing

# 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 A Module 1: Machine Shop Orientation

This module will focus on the student learning what each machine does in the machine shop, as well as how to power on/off the machine.  Various types of cutting tools, drill, machine screws and reamers will be discussed, as well as how to look up basic information in the Machinery Handbook.

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

1. Identify and implement basic machine shop safety procedures
2. Identify all machines in the machine shop
3. Power on and power off each machine in the machine shop
4. Identify various types of cutting tools, drills and reamers
5. Look up basic information in the Machinery Handbook

### Module 1 Activities

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 Read Machining Fundamentals, Chapter 1 - Introduction to Machining Technology

Text Book

 Read Machining Fundamentals, Chapter 3 - Shop Safety

Text Book

 Read Machining Fundamentals, Chapter 7 - Hand Tools

Text Book

 Read Machining Fundamentals, Chapter 8 – Fasteners

Text Book

 Read Machining Fundamentals, Chapter 28 - Metal Characteristics

Text Book

 View Shop Safety presentation

<https://www.slideshare.net/slideshow/workshop-safety-and-equipmentpptx/257322357>

 Watch video: Fasteners, machine screws, and bolts (10:40)

<https://www.youtube.com/watch?v=R3w2XWOwYS8>

 Watch video: Screws Lags Bolts And Washers Types (1:31)

<https://www.youtube.com/watch?v=w0s5COJPoes>

 Watch video: How to identify and use different screws (4:42)

<https://www.youtube.com/watch?v=YU8SlXfWOR4>

 Watch video: Cutting Tools 101

<https://www.youtube.com/watch?v=6PnAZlMlT3k>

<https://www.youtube.com/watch?v=J63dZsw7Ia4>

 Complete Quiz 112 – 1

See Quiz INT112-1 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 112-1.1 and Lab 112-1.2

See Lab Documents

 Schedule and complete Lab 112-1.1

See INT112 1.1 Lab Document

 Schedule and complete Lab 112-1.2

See INT112 1.2 Lab Document

# Principles of Machining A Module 2: Sawing & Sanders

This module will focus on the student learning the basics of, and how to use various sawing tools in the machine shop.  The students will use saws to cut out a part, as the first part of their JPBL (Job Planning, Benchwork, Layout) NIMS certification.  Students will also be able to identify and use various measuring tools in the machine shop to accurately measure various parts.

1. Measure length and thickness of parts using dial calipers and micrometers
2. Measure length using a Machinist Steel Rule
3. Identify the important parts of various saws, sanders and hand grinders in the lab
4. Identify various types of saw blades and their applications
5. Identify various types of sanders and their applications
6. Saw out a part from rough metal stock
7. Identify various measuring devices and how to care for them

### Module 2 Activities

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 Read Machining Fundamentals, Chapter 5 – Measurement.

Text Book

 Watch video: How to read a standard micrometer (6:57)

<https://www.youtube.com/watch?v=oiAutI0i5YE>

 Watch video: Digital Calipers (1:56)

<https://www.youtube.com/watch?v=KYpB-BOx01g>

 Watch Videos: Direct Measurement Tools (10.26)

<https://www.youtube.com/watch?v=5Bh-R7orEnE>

 Watch Video: Indirect Measurement Tools

<https://www.wisc-online.com/learn/technical/machine-tool/mtl19314/indirect-measurement-instruments>

 Watch Video: Dial Indicator (5:18)

<https://www.youtube.com/watch?v=Iucf8DW5XMs>

 Read Machining Fundamentals, Chapter 10 - Cutting Fluids

Text Book

 Read Machining Fundamentals, Chapter 11 – Sawing

Text Book

 Read Machining Fundamentals, Chapter 20 - Band Machining & Broaching

Text Book

 Watch video: Sawing Safety (5:00)

<https://www.youtube.com/watch?v=01dQt1NVAJg>

 Watch video: Vertical Band Saw Safety (3:11)

<https://www.youtube.com/watch?v=5R2CxMWfFyY>

 Watch video: Belt Sander Safety (7:00)

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

 Watch video: Starrett Band Saw Blades (4:04)

<https://www.youtube.com/watch?v=FzMZt-mFADU>

 Complete Quiz 112 – 2

See Quiz INT112-2 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 112 - 2.1 and Lab 112 - 2.2

See Lab Documents

 Schedule and complete Hands-on Lab 112 - 2.1

See INT112 2.1 Lab Document

 Schedule and complete Hands-on Lab 112 - 2.2

See INT112 2.2 Lab Document

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# Principles of Machining A Module 3 - Job Planning, Benchwork & Layout, and Drill Press

This module will focus on the student learning how to plan and layout a project, which will include layout, center punching, drilling, countersinking and tapping holes in a workpiece.  The students will use a vertical drill press to cut out the holes, reamers to widen the holds, and taps to create a thread in the hole.  This module will also prepare the student for the JPBL NIMS certification.

1. Layout the location of hole center on a workpiece based on a mechanical print
2. Center punch the hole centers on the workpiece
3. Drill holes on a workpiece based on the mechanical print
4. Widen holes with a reamer
5. Countersink one of the holes on a workpiece
6. Tap a thread into one of the holes of a workpiece based on the mechanical print

### Module 3 Activities

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 Read Machining Fundamentals, Chapter 4 - Understanding Drawings

Text Book

 Read Machining Fundamentals, Chapter 6 - Layout Work

Text Book

 Watch video: GD&T Fundamentals (13:14)

<https://www.youtube.com/watch?v=lBGo_pvbM6Q>

 Watch video: Understanding Drawings (20:22)

<https://www.youtube.com/watch?v=1roPfzjHXnM>

 Read Machining Fundamentals, Chapter 12 – Drilling

Text Book

 Review Cutting Speed 101 handout

 Watch video: Parts of a Drill Press (7:03)

<https://www.youtube.com/watch?v=nTM00RZ8qKg>

 Watch video: Drill Press Safety (4:38)

<https://www.youtube.com/watch?v=HuirRi-TQBM>

 Watch video: Drill Press Accident (1:27)

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

 Complete Quiz 112 – 3

See Quiz INT112-3 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 112 - 3.1 and Lab 112 - 3.2

See Lab Documents

 Schedule and complete Hands-on Lab 112 - 3.1

See INT112 3.1 Lab Document

 Schedule and complete Hands-on Lab 112 - 3.2

See INT112 3.2 Lab Document

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