Northwest State Community College  
Course Information Sheet

# Course Information

Title: Principles of Machining C

Course Number: INT 114

Credit Hours: 1

Pre-requisite: INT 113

# Description

This course will introduce the student to a manual milling machine that will be used to machine a metal workpiece. The focus will be on how to utilize the manual controls of a milling machine, as well as the tooling, and how to calculate the speeds and feeds. The fixturing and setup procedure of the milling machine will be discussed, as well as how to program a Proto-Trak controller on milling machines that has this type of system.

# Learning Outcomes

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

1. Identify the major components of different types of milling machines
2. Secure a workpiece into a fixture on a manual milling machine
3. Calculate the speeds, feeds and DOC with different cutting tools and materials
4. Identify different types of cutters used on milling machines
5. Adjust the fixturing, controls and gauging on a milling machine to start a project
6. Machine a workpiece on a milling machine, based on a mechanical blueprint
7. Set up a Proto-Trak controller on a milling machine to implement automatic milling

# 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 C Module 1: The Milling Machine

This module will focus on the milling machine. By the end of this module, you should be able to safely use a mill to perform basic operations.

1. Identify main components of a milling machine
2. Identify the type and applications of various cutting tools used in a milling machine
3. Describe and demonstrate proper setup of the machine and workpiece, including tooling and fixtures.
4. Calculate speeds and feeds with different cutting tools and materials
5. Perform basic milling operations, based on a print

### Module 1 Activities

Top of Form

 Read Machining Fundamentals, Chapter 17 - The Milling Machine

Text Book

 Read Machining Fundamentals, Chapter 18, 18.1-18.3 - Milling Maching Operations

Text Book

 Watch video: Milling Machine Safety (8:42)

<https://www.youtube.com/watch?v=GW3bODd_jDE>

 Review Cutting Speeds 101 Handout

See attached file in the folder

 Watch video: Milling Basic Machine Anatomy (3:07)

<https://www.youtube.com/watch?v=U99asuDT97I>

 Watch video: Milling Work Holding (2:36)

<https://www.youtube.com/watch?v=J1VtofzVG24>

 Watch video: Work Locating (indicating workholders) (3:03).

<https://www.youtube.com/watch?v=r7-eEj_qq5M>

 Watch video: Test Indicator (9:55)

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

 Watch video: Setting a Work Zero with an Edge Finder (3:49)

<https://www.youtube.com/watch?v=t2Y6xR7iCto>

 Watch video: Milling Basic Operation (3:25)

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

 Watch video: Climb Milling vs Conventional Milling (18:38)

<https://www.youtube.com/watch?v=galm5_6SUcM>

 Watch video: Face Milling (3:23)

<https://www.youtube.com/watch?v=9OsNUi_o6C4>

 Watch video: Using Endmills (3:22)

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

 Complete Quiz 114-1

See Quiz INT114-1 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 114-1.1 and 114-1.2

See Lab Documents

 Schedule and complete Hands-on Lab 114-1.1

See INT114 1.1 Lab Document

 Schedule and complete Hands-on Lab 114-1.2

See INT114 1.2 Lab Document

Bottom of Form

# Principles of Machining C Module 2: Milling

This module will focus on the milling machine. By the end of this module, you should be able to safely use a mill to perform basic operations.

1. Describe the function of jigs and fixtures
2. Define gear nomenclature
3. Describe the process for machining gears on a milling machine

### Module 2 Activities

Top of Form

 Read Machining Fundamentals, Chapter 9 - Jigs & Fixtures

Text Book

 Read Machining Fundamentals, Chapter 18, 18.4-18.10 - Milling Maching Operations

Text Book

 Watch video: Drilling, Tapping, and Boring (3:46)

<https://www.youtube.com/watch?v=om6GQKfoS1g>

 Watch video: Tramming your vice (3:49)

<https://www.youtube.com/watch?v=r50TYp98Vgk>

 Watch video: Tramming or Indicating the Head (8:03)

<https://www.youtube.com/watch?v=JfANyiS8Hs4>

 Watch video: Jigs and Fixtures for Machine Shops (9:01)

<https://www.youtube.com/watch?v=wFklVt-hHNE>

 Watch video: Differences between Jigs and Fixtures (3:42)

<https://www.youtube.com/watch?v=hemuxySij-k>

 Complete Quiz 114-2

See Quiz INT114-2 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 114-2.1

See Lab Documents

 Schedule and complete Hands-on Lab 114-2.1

See INT114 2.1 Lab Document

Bottom of Form

# Principles of Machining C Module 3 - Computer Controlled Milling

This module will focus on the milling machine. By the end of this module, you should be able to safely use a mill to perform basic operations.

1. Utilize a Proto-Track controller to machine a part.
2. Identify advanages of computer-controlled machining.
3. Describe uses of Cartesian and Polar coordinate systems.
4. Describe multiple options for programming a CNC machine.

### Module 3 Activities

Top of Form

 Read Machining Fundamentals, Chapter 21 - Introduction to CNC Machining

Text Book

 Read Machining Fundamentals, Chapter 22 - CNC Programming Basics

Text Book

 Review the Proto-Track Edge programming and operating manual

 Watch video: Bridgeport w/ CNC Prototrak Basics (16:14)

<https://www.youtube.com/watch?v=MtaJkX3ZbZs>

 Complete Quiz 114-3

See Quiz INT114-3 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 114-3.1

See Lab Documents

 Schedule and complete Hands-on Lab 114-3.1

See INT114 3.1 Lab Document

Bottom of Form

******

**DOL DISCLAIMER:**

**“This workforce product was funded by a grant awarded by the U.S. Department of Labor’s Employment and Training Administration. The product was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The U.S. Department of Labor makes no guarantees, warranties, or assurances of**

**any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership. This product is copyrighted by the institution that created it.”**

 This work is licensed under a [Creative Commons Attribution 4.0 International License.](http://creativecommons.org/licenses/by/4.0/)