

## MACH114 : \* Intermediate Vertical Mill Processes

### General Information

<b>Author:</b>	• Jorge Palma
<b>Course Code (CB01) :</b>	MACH114
<b>Course Title (CB02) :</b>	* Intermediate Vertical Mill Processes
<b>Department:</b>	MACH
<b>Proposal Start:</b>	Fall 2024
<b>TOP Code (CB03) :</b>	(0956.30) Machining and Machine Tools
<b>CIP Code:</b>	(48.0501) Machine Tool Technology/Machinist.
<b>SAM Code (CB09) :</b>	Clearly Occupational
<b>Distance Education Approved:</b>	No
<b>Will this course be taught asynchronously?:</b>	No
<b>Course Control Number (CB00) :</b>	CCC000257643
<b>Curriculum Committee Approval Date:</b>	05/22/2024
<b>Board of Trustees Approval Date:</b>	07/16/2024
<b>Last Cyclical Review Date:</b>	05/22/2024
<b>Course Description and Course Note:</b>	MACH 114 is a course that provides specialized training on the vertical mill. Building on the basic processes, this class develops skills working on vises, fixturing, angular milling, end mills, shell mills, fly cutting, radius cutting, and undercutting.
<b>Justification:</b>	Mandatory Revision
<b>Academic Career:</b>	• Credit
<b>Mode of Delivery:</b>	
<b>Author:</b>	
<b>Course Family:</b>	

### Academic Senate Discipline

<b>Primary Discipline:</b>	• Machine Tool Technology (Tool and die making)
<b>Alternate Discipline:</b>	No value
<b>Alternate Discipline:</b>	No value

### Course Development

<b>Basic Skill Status (CB08)</b>	<b>Course Special Class Status (CB13)</b>	<b>Grading Basis</b>
Course is not a basic skills course.	Course is not a special class.	• Grade with Pass / No-Pass Option
<input type="checkbox"/> Allow Students to Gain Credit by Exam/Challenge	<b>Pre-Collegiate Level (CB21)</b>	<b>Course Support Course Status (CB26)</b>
	Not applicable.	Course is not a support course

## General Education and C-ID

### General Education Status (CB25)

Not Applicable

### Transferability

Not transferable

### Transferability Status

Not transferable

## Units and Hours

### Summary

<b>Minimum Credit Units (CB07)</b>	2
<b>Maximum Credit Units (CB06)</b>	2
<b>Total Course In-Class (Contact) Hours</b>	72
<b>Total Course Out-of-Class Hours</b>	36
<b>Total Student Learning Hours</b>	108

### Credit / Non-Credit Options

#### Course Type (CB04)

Credit - Not Degree Applicable

#### Noncredit Course Category (CB22)

Credit Course.

#### Noncredit Special Characteristics

No Value

#### Course Classification Code (CB11)

Credit Course.

Variable Credit Course

#### Funding Agency Category (CB23)

Not Applicable.

Cooperative Work Experience

Education Status (CB10)

### Weekly Student Hours

	In Class	Out of Class
Lecture Hours	1	2
Laboratory Hours	3	0
Studio Hours	0	0

### Course Student Hours

<b>Course Duration (Weeks)</b>	18
<b>Hours per unit divisor</b>	0
<b>Course In-Class (Contact) Hours</b>	
Lecture	18
Laboratory	54
Studio	0
<b>Total</b>	72
<b>Course Out-of-Class Hours</b>	
Lecture	36
Laboratory	0
Studio	0
<b>Total</b>	36

## Time Commitment Notes for Students

No value

## Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

## Pre-requisites, Co-requisites, Anti-requisites and Advisories

### Prerequisite

MACH101 - Machine Technology I (in-development)

#### Objectives

- Demonstrate safety practices with machinery during milling and lathe operations.
- Perform a series of fundamental machining exercises in lathe and milling operations.
- Use precision inspection equipment.
- Demonstrate drilling, reaming, tapping and knurling procedures.
- Demonstrate the setup and utilization of various lathe and milling operations and procedures.

## Entry Standards

Entry Standards

## Course Limitations

Cross Listed or Equivalent Course

## Specifications

Methods of Instruction

Methods of Instruction                      Lecture

Methods of Instruction                      Laboratory

<b>Methods of Instruction</b>	Discussion			
<b>Methods of Instruction</b>	Multimedia			
<b>Methods of Instruction</b>	Collaborative Learning			
<b>Methods of Instruction</b>	Demonstrations			
<b>Methods of Instruction</b>	Presentations			
<b>Out of Class Assignments</b>	<ul style="list-style-type: none"> <li>Reading assignments</li> </ul>			
<b>Methods of Evaluation</b>	<b>Rationale</b>			
Exam/Quiz/Test	Quizzes			
Exam/Quiz/Test	In-class projects (e.g. advanced hammer)			
Exam/Quiz/Test	Final examination			
Exam/Quiz/Test	Final project (e.g. mill vise)			
<b>Textbook Rationale</b>				
No Value				
<b>Textbooks</b>				
<b>Author</b>	<b>Title</b>	<b>Publisher</b>	<b>Date</b>	<b>ISBN</b>
John R. Walker, Bob Dixon	Machining Fundamentals	Goodheart-Willcox	2023	978-1-64925-979-0
<b>Other Instructional Materials (i.e. OER, handouts)</b>				
No Value				
<b>Materials Fee</b>				
No value				

<b>Learning Outcomes and Objectives</b>
Course Objectives

Complete a series of advance milling machining exercises.

Plan and produce a project using the rotary table and the indexing head.

Demonstrate knowledge of advanced milling operations by completing a complex milling project..

Perform safe machining skills by demonstrating milling, pocketing, slotting, tapping and boring.

Relate the uses of the vise, rotary table, and the indexing head.

## SLOs

**Identify various cutting tools such as drills, end mills, center drills, reamers, taps and boring bars.**

Expected Outcome Performance: 70.0

<i>ILOs</i> Core ILOs	Demonstrate depth of knowledge in a course, discipline, or vocation by applying practical knowledge, skills, abilities, theories, or methodologies to solve unique problems.
<i>MACH</i> Machinist - Certificate	Demonstrate the skills required in the field of machine and manufacturing technology, such as use of manual machining equipment.
<i>MACH</i> Machinist - A.S. Degree Major	Demonstrate the skills required in the field of machine and manufacturing technology, such as use of manual machining equipment.

**Complete a planned project using the rotary table and the indexing head.**

Expected Outcome Performance: 70.0

<i>ILOs</i> Core ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.
	Demonstrate depth of knowledge in a course, discipline, or vocation by applying practical knowledge, skills, abilities, theories, or methodologies to solve unique problems.
<i>MACH</i> Machinist - Certificate	Demonstrate the skills required in the field of machine and manufacturing technology, such as technical mathematics.  Demonstrate the skills required in the field of machine and manufacturing technology, such as use of manual machining equipment.
<i>MACH</i> Machinist - A.S. Degree Major	Demonstrate the skills required in the field of machine and manufacturing technology, such as technical mathematics.  Demonstrate the skills required in the field of machine and manufacturing technology, such as use of manual machining equipment.

**Compare the various part-holding devices used on the vertical mill.**

Expected Outcome Performance: 70.0

<i>ILOs</i> Core ILOs	Demonstrate depth of knowledge in a course, discipline, or vocation by applying practical knowledge, skills, abilities, theories, or methodologies to solve unique problems.
<i>MACH</i> Machinist - Certificate	Demonstrate the skills required in the field of machine and manufacturing technology, such as use of manual machining equipment.
<i>MACH</i> Machinist - A.S. Degree Major	Demonstrate the skills required in the field of machine and manufacturing technology, such as use of manual machining equipment.

## Additional SLO Information

**Does this proposal include revisions that might improve student attainment of course learning outcomes?**

No

**Is this proposal submitted in response to learning outcomes assessment data?**

No

**If yes was selected in either of the above questions for learning outcomes, explain and attach evidence of discussions about learning outcomes.**

No Value

**SLO Evidence**

No Value

## Course Content

### Lecture Content

#### **Vises (2 hours)**

- Construction
- Screw type vise
- Quick action vise
- Air vise
- All angle vise
- Replaceable jaw

#### **Fixtures (2 hours)**

- Construction
- Methods of locating
- Clamping
- Set-up block

#### **Angular Milling (4 hours)**

- Tilting of the head
- Use of angular vise
- Angle plate set-up
- Use of the sine bar

#### **End Mills (4 hours)**

- Three flute
- Four flute
- Calculating spindle speed
- Types of spirals
- Roughing
- RADIUSING
- Corner rounding
- Tapered

#### **Shell Mills (2 hours)**

- Cutter selection
- Calculating spindle
- Mounting
- Cutter relief angle

#### **Radius Cutting (2 hours)**

- Cutter selection
- Angling of head
- Calculating spindle speed

#### **Special Cutters (2 hours)**

- Dove tail cutter
- T-slot cutter
- Tapered relief cutter
- Slotting cutter

- Slitting saw

**Total hours: 18**

## Laboratory/Studio Content

### Vises (5 hours)

- Construction
- Screw type vise
- Quick action vise
- Air vise
- All angle vise
- Replaceable jaw

### Fixtures (5 hours)

- Construction
- Methods of locating
- Clamping
- Set-up block

### Angular Milling (8 hours)

- Tilting of the head
- Use of angular vise
- Angle plate set-up
- Use of the sine bar

### End Mills (8 hours)

- Three flute
- Four flute
- Calculating spindle speed
- Types of spirals
- Roughing
- Radiusing
- Corner rounding
- Tapered

### Shell Mills (4 hours)

- Cutter selection
- Calculating spindle
- Mounting
- Cutter relief angle

### Radius Cutting 10 hours

- Cutter selection
- Angling of head
- Calculating spindle speed

### Special Cutters (14 hours)

- Dove tail cutter
- T-slot cutter
- Tapered relief cutter
- Slotting cutter
- Slitting saw

**Total hours: 54**

## Additional Information

Is this course proposed for GCC Major or General Education Graduation requirement? If yes, indicate which requirement in the two areas provided below.

No

### GCC Major Requirements

No Value

### GCC General Education Graduation Requirements

No Value

**Repeatability**

Not Repeatable

**Justification (if repeatable was chosen above)**

No Value

**Resources**

**Did you contact your departmental library liaison?**

No

**If yes, who is your departmental library liaison?**

No Value

**Did you contact the DEIA liaison?**

No

**Were there any DEIA changes made to this outline?**

No Value

**If yes, in what areas were these changes made:**

No Value

**Will any additional resources be needed for this course? (Click all that apply)**

No Value

**If additional resources are needed, add a brief description and cost in the box provided.**

No Value