

## MACH109 : Principles Of Tool Engineering

### General Information

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Course Code (CB01) :	MACH109
Course Title (CB02) :	Principles Of Tool Engineering
Department:	MACH
Proposal Start:	Fall 2024
TOP Code (CB03) :	(0956.30) Machining and Machine Tools
CIP Code:	(48.0501) Machine Tool Technology/Machinist.
SAM Code (CB09) :	Clearly Occupational
Distance Education Approved:	No
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000411256
Curriculum Committee Approval Date:	05/22/2024
Board of Trustees Approval Date:	07/16/2024
Last Cyclical Review Date:	05/22/2024
Course Description and Course Note:	MACH 109 is an advanced course in machine shop training presenting systems of production. Interchangeability, and dimensioning as they pertain to tool design and construction of drill jigs, milling, grinding, and lathe fixtures, locating and clamping of parts, tooling for horizontal turret lathes, and tool room inspection and gauging are examined. Training required for engineers and designers noting duties and positions in manufacturing organizations are investigated.
Justification:	Mandatory Revision
Academic Career:	<ul style="list-style-type: none"><li>Credit</li></ul>
Mode of Delivery:	
Author:	
Course Family:	

### Academic Senate Discipline

Primary Discipline:	<ul style="list-style-type: none"><li>Machine Tool Technology (Tool and die making)</li></ul>
Alternate Discipline:	No value
Alternate Discipline:	No value

## Course Development

### Basic Skill Status (CB08)

Course is not a basic skills course.

Allow Students to Gain Credit by Exam/Challenge

### Course Special Class Status (CB13)

Course is not a special class.

### Pre-Collegiate Level (CB21)

Not applicable.

### Grading Basis

- Grade with Pass / No-Pass Option

### Course Support Course Status (CB26)

Course is not a support course

## General Education and C-ID

### General Education Status (CB25)

Not Applicable

### Transferability

Transferable to CSU only

### Transferability Status

Approved

## Units and Hours

### Summary

<b>Minimum Credit Units (CB07)</b>	5
<b>Maximum Credit Units (CB06)</b>	5
<b>Total Course In-Class (Contact) Hours</b>	162
<b>Total Course Out-of-Class Hours</b>	108
<b>Total Student Learning Hours</b>	270

### Credit / Non-Credit Options

#### Course Type (CB04)

Credit - 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	3	6
Laboratory Hours	6	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	54
Laboratory	108
Studio	0

**Total** 162

**Course Out-of-Class Hours**

Lecture 108

Laboratory 0

Studio 0

**Total** 108

**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**

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**Prerequisite**

MACH104 - Machine Technology IV

**Objectives**

- Perform a series of advanced machining exercises.
  - Complete a performance test to demonstrate proper use and handling of precision measuring instruments.
  - Demonstrate precision inspection operations.
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**Entry Standards**

Entry Standards

Think critically and attain satisfactory grades on written quizzes and examinations.

## Course Limitations

Cross Listed or Equivalent Course

## Specifications

### Methods of Instruction

Methods of Instruction                      Lecture

Methods of Instruction                      Laboratory

Methods of Instruction                      Multimedia

Methods of Instruction                      Demonstrations

### Out of Class Assignments

- Reading assignments

### Methods of Evaluation

### Rationale

Exam/Quiz/Test

Quizzes

Exam/Quiz/Test

Demonstration of machine set-up and use

Exam/Quiz/Test

Final exam

### Textbook Rationale

No Value

### Textbooks

Author	Title	Publisher	Date	ISBN
John R. Walker, Bob Dixon	Machining Fundamentals	Goodheart-Willcox	2023	978-1-64925-979-0

### Other Instructional Materials (i.e. OER, handouts)

No Value

**Materials Fee**

No value

**Learning Outcomes and Objectives****Course Objectives**

Perform a series of machining exercises.

List the appropriate options for securing a project on the machine base.

Explain the skills applied to production application of tooling.

Demonstrate advanced inspection operations.

**SLOs****Explain the safety equipment and practices employed in the machining process.**

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.
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<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.
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<i>MACH</i> Machinist - Certificate	Demonstrate the skills required in the field of machine and manufacturing technology, such as use of manual machining equipment.
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**Identify the major differences and benefits between tooling and automated machines.**

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.
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<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.
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<i>MACH</i> Machinist - Certificate	Demonstrate the skills required in the field of machine and manufacturing technology, such as use of manual machining equipment.
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**Accurately calculate measurements using a range of advanced techniques in order to create special tooling.**

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.
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	Demonstrate depth of knowledge in a course, discipline, or vocation by applying practical knowledge, skills, abilities, theories, or methodologies to solve unique problems.
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	Use quantitative and/or analytical mathematical skills to solve problems and to interpret, evaluate, and process information and data to draw logical conclusions and support claims.
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<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.

## Course Content

### Lecture Content

#### Related Classroom Assignments (4 hours)

#### Jigs and Fixtures (17 hours)

- Purposes and differences between a jig and a fixture
- Considerations as to size and weight in design of jig and fixtures
- Choice of materials in construction jigs and fixtures
- Drill press jigs
- Boring jigs
- Closed or boss jigs
- Milling fixture
- Grinding fixtures
- Adjustable fixtures

#### Locating Points (16 hours)

- Types of locating points
- Relationships between locating points and finished surfaces

#### Clamping devices (17 hours)

- Proper placement for maximum holding
- Ease and speed of operation of various clamps

**Total hours: 54**

### Laboratory/Studio Content

#### Laboratory Assignments (108 hours)

- Student is given a casting and/or a print showing machined holes or surfaces and tolerances to be held. After design, but before making the jig or fixture students prepare a written report defending their design as to:
  - Type of machine best suited to do the job
  - Type of jig or fixture appropriate to do the job
  - Clamping and locating the part
  - Speed and ease in using jig or fixture
- Student then builds and makes a test run of the jig or fixture

**Total hours: 108**

## 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