

MACH104 : Machine Technology IV

General Information

Author:	<ul style="list-style-type: none">Jorge Palma
Course Code (CB01) :	MACH104
Course Title (CB02) :	Machine Technology IV
Department:	MACH
Proposal Start:	Spring 2025
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) :	CCC000628528
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 104 is a continuation of advanced and complicated operations of machine tools and equipment. Lectures and demonstrations include an investigation of heat-treatment of metals, special metals and their uses, abrasives, grinding wheels, and efficient use of surface, cylindrical, and tool cutter grinders. Basic tool and die work in which the student designs and builds jigs and fixtures are offered to students showing advanced abilities.
Justification:	Mandatory Revision
Academic Career:	<ul style="list-style-type: none">Credit
Mode of Delivery:	
Author:	
Course Family:	

Academic Senate Discipline

Primary Discipline:	<ul style="list-style-type: none">Machine Tool Technology (Tool and die making)
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

Minimum Credit Units (CB07) 3

Maximum Credit Units (CB06) 3

Total Course In-Class (Contact) Hours 126

Total Course Out-of-Class Hours 36

Total Student Learning Hours 162

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	1	2
Laboratory Hours	6	0
Studio Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	54
Course In-Class (Contact) Hours	
Lecture	18
Laboratory	108
Studio	0

Total 126

Course Out-of-Class Hours

Lecture	36
Laboratory	0
Studio	0
Total	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

MACH103 - Machine Technology III (in-development)

Objectives

- Perform a series of intermediate machining exercises and precision inspection operations.

Entry Standards

Entry Standards

Successfully complete a performance test to demonstrate proper use and handling of precision measuring instruments.

Demonstrate critical thinking skills through projects, written assignments, 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 Discussion

Methods of Instruction Multimedia

Methods of Instruction Collaborative Learning

Methods of Instruction Demonstrations

Out of Class Assignments

- Written reports (e.g. project descriptions)
- Reading assignments

Methods of Evaluation

Rationale

Exam/Quiz/Test

Quizzes

Project/Portfolio

Final project (e.g. sterling heat engine)

Exam/Quiz/Test

Proficiency evaluation (e.g. machine set-up, tooling set-up)

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 advanced machining exercises.

Complete a performance test to demonstrate proper use and handling of precision measuring instruments.

Demonstrate precision inspection operations.

Demonstrate advanced skills through projects and exercises on the lathe, mill, and grinding machines.

Explain the appropriate uses for each machine and tooling and the advanced techniques applicable for each circumstance.

Calculate measurements accurately using a range of advanced techniques in order to machine precise parts.

SLOs

Compare and interpret measured components of the sterling heat engine to assure precision.

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.
	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.
<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.
<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.

Assemble and create a sterling heat engine using advanced machining techniques.

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.

MACH
Machinist - A.S.
Degree Major

Demonstrate the skills required in the field of machine and manufacturing technology, such as use of manual machining equipment.

MACH
Machinist - Certificate

Demonstrate the skills required in the field of machine and manufacturing technology, such as use of manual machining equipment.

Evaluate the sterling heat engine for proper operation.

Expected Outcome Performance: 70.0

ILOs
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.

MACH
Machinist - Certificate

Demonstrate the skills required in the field of machine and manufacturing technology, such as use of manual machining equipment.

MACH
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

Measuring Instruments (3 hours)

- Surface gauge
- Test indicator
- Gauge blocks
- Pin gauges
- Dial indicator
- Indicator
- micrometer
- Comparator

Coolants (2 hours)

- Types
- Applications
- Delivery systems
- Mill, Lathe & machine usage

Lubricants (2 hours)

- Types
- Applications
- Delivery systems
- Mill & Lathe machine usage

Preventive Maintenance (2 hours)

- Machine inspection
- Lubrication requirements
- Belts & drive systems
- Bearings & bushings
- Tool holding systems

Heat Treatment (2 hours)

- Classifications and designations of steels
- Cyaniding, carburizing, nitriding steels
- Hardening and tempering steels
- Hardness testing machines
- Hardness and heat treatment charts

Abrasives and Grinding Wheels (3 hours)

- Bonds, wheel structure, wheel grading, wheel selection, and speeds
- Grinding theory Chatter and vibration
- Dressing, grading, and loading grinding wheels

Grinding Machines (3 hours)

- Sharpening milling cutter, tap reamer
- Types of cylindrical grinders
- Operations of cylindrical grinders
- Uses and types of surface grinders
- Specialized grinder set-ups
- Equipment used for interval grinding

Sterling Engine Project (1 hour)

- Project instructions
- Materials
- Machining
- Assembly
- Testing

Total hours: 18

Laboratory/Studio Content

Measuring Instruments (2 hours)

- Surface gauge
- Test indicator
- Gauge blocks
- Pin gauges
- Dial indicator
- Indicator
- micrometer
- Comparator

Coolants (2 hours)

- Types
- Applications
- Delivery systems
- Mill, Lathe & machine usage

Lubricants (2 hours)

- Types
- Applications
- Delivery systems
- Mill & Lathe machine usage

Preventive Maintenance (3 hours)

- Machine inspection
- Lubrication requirements
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Heat Treatment (3 hours)

- Classifications and designations of steels
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Abrasives and Grinding Wheels (3 hours)

- Bonds, wheel structure, wheel grading, wheel selection, and speeds
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- Dressing, grading, and loading grinding wheels

Grinding Machines (3 hours)

- Sharpening milling cutter, tap reamer
- Types of cylindrical grinders
- Operations of cylindrical grinders
- Uses and types of surface grinders
- Specialized grinder set-ups
- Equipment used for interval grinding

Sterling Engine Project (90 hours)

- Project instructions
- Materials
- Machining
- Assembly
- Testing

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