CAM231 : Advanced Mastercam Mill

General Information

Author:	• Jorge Palma
Course Code (CB01) :	CAM231
Course Title (CB02) :	Advanced Mastercam Mill
Department:	CAM
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) :	CCC000628524
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:	CAM 231 is an advanced Mastercam mill course which covers the advanced programming aspects of CNC milling, how to configure the Mastercam workspace, properly orient the part geometry, and complete the job setup. Students will learn how to create more complex 3D geometry and advanced 3-Axis toolpaths, discover high-speed dynamic milling, tool definition, axis combinations, and complete a tool plane setup.
Justification:	Mandatory Revision
Academic Career:	• Credit
Mode of Delivery:	
Author:	
Course Family:	

Academic Senate Discipline

Primary Discipline:	• 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

Advisory

CAM230 - Basic Mastercam Mill (in-development)

Objectives

- Create geometry and toolpaths for Computer Numerical Control (CNC) mill.
- Set up a Computer Numerical Control (CNC) mill.
- Demonstrate roughing and finishing operations.
- Evaluate the geometry of a part.
- Perform a stock model operation.

Entry Standards

Entry Standards

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
Methods of Instruction	Presentations

Out of Class Assignments

- Individual project (e.g. create a part from a blue print)
- Group project (e.g. create a part program from a solid model)
- Calculations (e.g. acceptable rotational tool speeds)

Methods of Evaluation	Rationale
Exam/Quiz/Test	Quizzes
Exam/Quiz/Test	Practical laboratory examinations
Exam/Quiz/Test	Evaluation of final project (e.g. contour block)

Textbook Rationale

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Mike Wearne, Duane Weidinger	MasterCam 2020 Training Guide Mill 3D	CamInstructor Inc.	2022	978-1-77851-014-4

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

No Value

Materials Fee

No value

Learning Outcomes and Objectives

Course Objectives

Create complex 3D geometry and toolpaths for Mastercam mill.

Set up a Computer Numerical Control (CNC) milling machine.

Choose proper set-up tools for milling.

Demonstrate roughing and finishing operations.

Explain high speed dynamic milling.

SLOs

Demonstrate safe and appropriate part handling for advanced milling work. Expected Outcome Performance: 70.0

ILOs 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.
CAM A.S. Computer Numerical Control Technician	Use manual machine and CNC machine tools to produce manufactured parts.

Utilize and demonstrate advanced programming with Mastercam lathe. 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.
	Demonstrate depth of knowledge in a course, discipline, or vocation by applying practical knowledge, skills, abilities, theories, or methodologies to solve unique problems.
CAM A.S. Computer Numerical Control Technician	Apply various software programs to write CNC code for the production of manufactured parts.
	Use manual machine and CNC machine tools to produce manufactured parts.

Verify accuracy of program keystrokes using back-plot. Expected Outcome Performance: 70.0

CAM A.S. Computer Numerical Control Technician	Apply various software programs to write CNC code for the production of manufactured parts.
	Use manual machine and CNC machine tools to produce manufactured parts.

ILOs 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.

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

Introduction (3 hours)
- Modern advancements of Computer Numerical Control (CNC) and machining
- Review of machining basics
- Preparation for CNC machining

Milling Machining Set-up in Mastercam (2 hours)
- Setting up Mastercam configuration for Mill
- Orientation of the part
- Part zero in Mastercam
- Stock set-up in Mastercam

Creating Complex 3D Geometry (2 hours)
- Creating more complex lines, splines, arcs, and points
- Extract geometry from 3D solids
- Use levels, groups, and attributes
- Creating 3D milling surfaces

Modify Current Geometry (3 hours)
- Trim entities
- Divide and join entities
- Modify length
- Break two pieces
- Add fillet radius and chamfer
- Offset geometry
- Project geometry
- Geometry transformation (scale, rotate, etc.)

Mill Toolpaths (3 hours)
- Face milling the part
- Roughing and finishing the profile
- Pocket milling
- Drilling, Reaming, Tapping, Boring
- Radius and chamfers
- Canned cycles
- Opti rough
- High speed milling

Part Handling in Mastercam (2 hours)
- Set up stock and vise
- Use of custom planes

- Custom vise jaws
- Mill vise stops
- Mill tool manager
- Toolpath and stock transform

Set up CNC Mill with Tooling (3 hours)
- Locate a desired work holding fixture on the machine
- Indicate vise or work holding fixture
- Load the proper tool holders
- Find part zero
- Set up tools
- Verify and run a complex mill part

Total hours: 18

Laboratory/Studio Content

Milling Machining Set-up in Mastercam (18 hours)
- Setting up Mastercam configuration for Mill
- Orientation of the part
- Part zero in Mastercam
- Stock set-up in Mastercam

Creating Complex 3D Geometry (18 hours)
- Creating more complex lines, splines, arcs, and points
- Extract geometry from 3D solids
- Use levels, groups, and attributes
- Creating 3D milling surfaces

Modify Current Geometry (18 hours)
- Trim entities
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Mill Toolpaths (18 hours)
- Face milling the part
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- Set up stock and vise
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Set up CNC Mill with Tooling (18 hours)
- Locate a desired work holding fixture on the machine
- Indicate vise or work holding fixture
- Load the proper tool holders
- Find part zero
- Set up tools
- Verify and run a complex mill part

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 liason?

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