College Curriculum Committee

Meeting Agenda Package

May 27, 2025

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College Curriculum Committee Meeting Agenda

Facilitator: Charles Hobbs—College Curriculum Committee Chair
Recorder: Michael Vanoverbeck / Time Keeper: TBD
Date: May 27, 2025 / Time: 2:00 p.m. - 3:30 p.m.
Location: VT-124

Vision:
Compton College will be the leading institution of student learning and success in higher education.
Mission Statement:
Compton College is a welcoming and inclusive community where diverse students are supported to pursue and attain student success. Compton College provides solutions to challenges, utilizes the latest techniques for preparing the workforce and provides clear pathways for completion of programs of study, transition to a university, and securing living-wage employment.

Attendees: Victoria Martinez__; Ahmad Manzoor__; Michael Vanoverbeck__; Mayela Rodriguez__; Stefani Baez__; Susan Johnson__; Arneshia Bryant-Horn __; Shay Brown__; Jose Martinez__; Kendahl Radcliffe __; Nathan Lopez__; Paul Flor __; David McPatchell__; Noemi Monterosso__; Jesse Mills __; Bradfield Conn __; Lynn Chung __; Melain McIntosh__; Sheri Berger__; Maya Medina__; Shante Mumford__; and Charles Hobbs__.

AGENDA:

1. Approval of Agenda: May 13, 2025.

2. Approval of Amended Minutes: April 22, 2025.

3. Approval of Minutes: May 27, 2025

4. Reports and Follow-up Questions From Attendees:
   a) Vice President, Academic Affairs
      - Standards Crosswalk presentation, continued
   b) Curriculum Analyst
   c) Articulation Officer
   d) Distance Education Faculty Coordinator
   e) SLO Coordinator

5. Consent Agenda Item(s):

a) **Two Year CTE Course Review – Revise Prerequisites and Course Hours**
MTT 112 – Computer Numerical Control Programming

b) **Two Year CTE Course Review -- Update Prerequisites – SLO Update**
MTT 115 – Numerical Control Graphics Programming
MTT 118 – 3D Numerical Control Graphics Programming
MTT 140 – Machine Shop Calculations

c) **Two Year CTE Course Review – SLO Update**
MTT 107 – Advanced Manufacturing Processes
MTT 120 – Manufacturing Print Reading

d) **Two Year CTE Course Review – No Proposed Changes**
MTT 101 – Introduction to Conventional and CNC Machining
MTT 103 – Conventional and CNC Turning
MTT 105 – Conventional and CNC Milling
MTT 110 – Introduction to CAD/CAM
MTT 160 – General Metals
MTT 201 – Introduction to Aerospace Fastener Technology
MTT 203 – Advanced Inspection of Fasteners and Measuring Instruments

6. Action Item(s):

a) New Courses – Second Read
CA 100 – Sanitation and Safety
CA 101 – Culinary Arts Orientation and Techniques
CA 102 – Culinary Nutrition
CA 103 – Culinary Skills I

7. College Curriculum Committee Representative Comments and/or Future Agenda Item Recommendation(s):
a) CCC representatives may provide a comment or future agenda item recommendation(s).

8. Public Comment(s):
a) Public comments may be presented by any person not on the CCC roster in attendance.

College Curriculum Committee Amended Meeting Minutes

Facilitator: Charles Hobbs—College Curriculum Committee Chair
Recorder: Michael VanOverbeck / Time Keeper: Victoria Martinez
Date: April 22, 2025 / Time: 2:00 p.m. - 3:30 p.m.
Location: VT-124

Vision:
Compton College will be the leading institution of student learning and success in higher education.
Mission Statement:
Compton College is a welcoming and inclusive community where diverse students are supported to pursue and attain student success. Compton College provides solutions to challenges, utilizes the latest techniques for preparing the workforce and provides clear pathways for completion of programs of study, transition to a university, and securing living-wage employment.

Attendees: Victoria Martinez_X_; Ahmad Manzoor__; Michael Vanoverbeck_X_; Mayela Rodriguez_X_; Stefani Baez_X_; Susan Johnson_X_; Arneshia Bryant-Horn _X_; Shay Brown_X_; Jose Martinez_X_; Kendahl Radcliffe _X_; Nathan Lopez_X_; Paul Flor __; David McPatchell_X_; Noemi Monterosso_X_; Jesse Mills _X_; Bradfield Conn _X_; Lynn Chung _X_; Melain McIntosh_X_; Sheri Berger_X_; Maya Medina_X_; Shante Mumford__; and Charles Hobbs_X_.

Meeting started 2:03pm

AGENDA:

Michael V. motioned to approve agenda. Jesse M. seconded. Unanimously approved.

1. Approval of Agenda: April 22, 2025.

Victoria M. motioned to approve minutes. Noemi M. seconded. Unanimously approved.

2. Approval of Minutes: April 8, 2025.

Victoria M. motioned to open 3a-e. Shay B. seconded.

3. Reports and Follow-up Questions From Attendees:

f) Vice President, Academic Affairs
   a. Common course numbering phase 1 update.
   b. Common Course Website (https://www.compton.edu/academics/common-course-numbering.aspx)
   c. Phase 2a

g) Curriculum Analyst
   a. Status update was given on the Common Course Number course proposals

h) Articulation Officer
   a. Common course numbering
   b. Concerns regarding STEM labs needing to be in-person for transferability.

i) Distance Education Faculty Coordinator
j) SLO Coordinator
    a. Course reports are due at the end of the Fall semester.

Michael V. motioned to close 3a-e. Jesse M. seconded.

Michael V. motioned to approve consent agenda items 4a-d. Noemi M. seconded. Unanimously approved.

4. Consent Agenda Item(s):

e) **Standard Course Review – No Proposed Changes**
HIST 129 – History of Los Angeles

f) **Two Year CTE Course Review – No Proposed Changes – DE Addendum – EFOMA Option**
COSM 140 – Cosmetology Practicum

g) Articulation/Transfer Review
ESTU 101 – Introduction to Ethnic Studies
ESTU 101H – Honors Introduction to Ethnic Studies

h) Common Course Numbering (CCN) Proposals
HIST C1001 - United States History to 1877
HIST C1001H - United States History to 1877 - Honors
HIST C1002 - United States History since 1865
HIST C1002H - United States History since 1865 – Honors

Michael V. motioned to open action item 5a. Noemi M. seconded.

5. Action Item(s): -
a) **New Program – First Read**
California General Education Transfer Curriculum (Cal-GETC) – Certificate of Achievement
Social Justice Studies: LGBTQ Studies – A.A. Degree for Transfer (AA-T)
High School Mathematics Certificate of Competency

Shay B. motioned to close action item 5a. Noemi M. seconded.

Noemi M. motioned to open 6a. Shay B. seconded.

6. College Curriculum Committee Representative Comments and/or Future Agenda Item Recommendation(s):
b) CCC representatives may provide a comment or future agenda item recommendation(s).

Michael V. motioned to close 6a. David M. seconded.

Michael V. motioned to open the floor for public comments. Noemi M. seconded.

7. Public Comment(s):

b) Public comments may be presented by any person not on the CCC roster in attendance.

Noemi M. motioned to close public comment. Brad C. seconded.

Meeting ended at 2:30pm

College Curriculum Committee Meeting Minutes

Facilitator: Charles Hobbs—College Curriculum Committee Chair
Recorder: Michael VanOverbeck / Time Keeper: Victoria Martinez
Date: May 13, 2025 / Time: 2:00 p.m. - 3:30 p.m.
Location: VT-124

Vision:
Compton College will be the leading institution of student learning and success in higher education.
Mission Statement:
Compton College is a welcoming and inclusive community where diverse students are supported to pursue and attain student success. Compton College provides solutions to challenges, utilizes the latest techniques for preparing the workforce and provides clear pathways for completion of programs of study, transition to a university, and securing living-wage employment.

Attendees: Victoria Martinez_X_; Ahmad Manzoor__; Michael VanOverbeck_X_; Mayela Rodriguez__; Stefani Baez__; Susan Johnson_X_; Arneshia Bryant-Horn _X_; Shay Brown_X_; Jose Martinez_X_; Kendahl Radcliffe __; Nathan Lopez_X_; Paul Flor __; David McPatchell_X_; Noemi Monterosso_X_; Jesse Mills _X_; Bradfield Conn _X_; Lynn Chung _X_; Melain McIntosh_X_; Sheri Berger_X_; Maya Medina_X_; Shante Mumford__; and Charles Hobbs_X_.

Meeting Start at 2pm

AGENDA:

Michael V. motioned to approve amended agenda. Victoria M. seconded. Unanimously approved.

1. Approval of Agenda: May 13, 2025.

Michael V. motioned to Table 2 until next meeting. Victoria M. seconded.

2. Approval of Minutes: April 22, 2025.
   a. Due to pending amendments. The plan is to bring the revised minutes back for approval at the next meeting.

Michael V. motioned to open 3a-e. David M. seconded.

3. Reports and Follow-up Questions From Attendees:
   k) Vice President, Academic Affairs
      a. Compton College accreditation cycle presentation was given.
      b. With the new 2024 standards, the amount has been reduced from 119 to 30.
      c. ASC members aligned the new standards to college campus committees.
      d. Reviewed the ACCJC Rubric self-evaluation questions and answered them.
         i. Standard 2.1
            1. Between Emerging and Developed

a. How could we get to "all", as described in Developed?

ii. Standard 2.2

1. Emerging

a. What can we do to move into Developed?
b. Build engagement and communication.
c. Program review rubric.

l) Curriculum Analyst

a. On June 30, 2025, Compton College will convert from Curriqunet META to the updated Maverick system. The system will be shut down during the summer. Therefore, faculty cannot submit curriculum.
b. All proposals currently pending revisions or that have not completed the review process this semester will be sent back to draft status to the faculty originator with an email notification. All proposals can be relaunched in the fall.
c. Training on how to use the new system will be provided.

m) Articulation Officer

a. **CCN Phase I Honors Courses:** All were denied approval due to a lack of clearly designated honors content. This outcome demonstrates that including "honors-type" assignments alone is insufficient. At the time of submission, no written policy was available outlining specific honors course content requirements. It was noted that some colleges received approval by inserting content from their non-CCN Honors CORs into Part 2 of the CCN template. A review of approved submissions from other California community colleges will be conducted to guide future updates. Although these courses were denied, they retain GE approval through a two-year phase-out period and may still be taught until summer 2027.
b. **CCN Phase II Honors Courses:** Courses such as ENGL 102H and HIST 101H, which have already been launched in CNET, will continue through the approval process. Updates to these CORs will be made in Fall 2025 in preparation for Cal-GETC re-submissions.
c. **Ethnic Studies GE Area:** Only **ESTU 102 – Introduction to African American Studies** was approved. Other Ethnic Studies courses were denied due to missing required elements.
d. **Cal-GETC Area 1B Decisions:** Some colleges received Cal-GETC 1B denials for their CCN ENGL C1001 Critical Thinking and Writing (ENGL 103). However, Compton received approval because we included Part 2 information (Content) in the CCN Template. Ideally the goal is for these CCN Templates to stand on their own in maintaining articulations, without Part 2. We'll see how our Chancellor's Office move forward with these various denials.

n) Distance Education Faculty Coordinator

a. DE Handbook update.

o) SLO Coordinator

a. Successful training sessions.

Michael V. motioned to close 3a-e. Susan J. seconded.

Michael V. motioned to approve consent agenda items 4a-e. Noemi M. seconded. Unanimously approved.

4. Consent Agenda Item(s):

i) **Program Inactivation**
CSU General Education Breadth Certificate of Achievement
Intersegmental General Education Transfer Curriculum (IGETC) Certificate of Achievement

j) **Standard Course Review – Update Conditions of Enrollment**
CSCI 101 – Problem Solving and Program Design Using C++

k) **Common Course Numbering (CCN) Proposals**
ARTH C1100 – Survey of Western Art from Prehistory through the Medieval Era
ENGL C1002 – Introduction to Literature
ENGL C1002H – Introduction to Literature – Honors
ECON C2001 – Principles of Microeconomics
ECON C2002 – Principles of Macroeconomics

l) **Two Year CTE Course Review – Update Conditions of Enrollment – Add Prerequisites**
CIS 165 – Advanced Application Development Swift

m) **Two Year CTE Course Review – SLO Update**
COSM 116 – Advanced Preparation for State Board Review
COSM 130 – Advanced Cosmetology Applications

5. Action Item(s):

Michael V. motioned to open action item 5a. David M. seconded.

a) New Courses – First Read
CA 100 – Sanitation and Safety
CA 101 – Culinary Arts Orientation and Techniques
CA 102 – Culinary Nutrition
CA 103 – Culinary Skills I
- OER?

Brad C. motioned to close action item 5a. David M. seconded.

Susan J. motioned to open action item 5b. Brad C. seconded.

b) Program Revision
Studio Arts – A. A. Degree for Transfer (AA-T)
Ethnic Studies – Chicana/o Studies Option – A.A. Degree

Michael V. motioned to close action item 5b. David M. seconded.

Shay B. motioned to open action item 5c. Jesse M. seconded.

c) New Program – Second Read
California General Education Transfer Curriculum (Cal-GETC) – Certificate of Achievement
Social Justice Studies: LGBTQ Studies – A.A. Degree for Transfer (AA-T)
High School Mathematics Certificate of Competency

Michael V. motioned to close action item 5c. David M. seconded.
Michael V. motioned to approve action item 5c. Noemi M. seconded. Unanimously approved.

Noemi M. motioned to open 6a. Michael V. seconded.

6. College Curriculum Committee Representative Comments and/or Future Agenda Item Recommendation(s):
- c) CCC representatives may provide a comment or future agenda item recommendation(s).
    - a. May want to investigate changes needed for the DE addendum.
        - i. Recommended that a document be drafted into what it should be and then bring it back to curriculum committee.

Brad C. motioned to close 6a. David M. seconded.

Jesse M. motioned to open 7a. Susan J. seconded.

7. Public Comment(s):
- c) Public comments may be presented by any person not on the CCC roster in attendance.

Shay B. motioned to close 7a. Michael V. seconded.

Meeting ended at 3:11pm

Two Year CTE Course Review – Revise Prerequisites and Course Hours – MTT 112 – Introduction to Conventional and CNC Machining

Course Information

Course Discipline: MTT
Course Division: Business and Industrial Studies
Course Number: 112
Full Course Title: Computer Numerical Control Programming
Short Title: CNC Programming
TOP Code: 095630 - Machining and Machine Tools
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status B - Transferable to CSU only.
Effective Term: Fall 2020
Board of Trustees Approval Date:
2019-12-10

Course Description

This course covers the study of Computer Numerical Control (CNC) programming with emphasis on contouring, canned cycles, cutter diameter compensation, looping, macro subroutines and multiple part programming for three axis CNC milling machines and CNC lathes.

Course Standards

Lecture Hours:
36.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
36.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
2.000
Activity Units:
0.000
Lab Units:
1.000
Min/Max Units:
3.000
Total Hours:
90.000
Grading Method:
Letter grade only

Course Requirements

Prerequisite
Subject MTT - Machine Tool Technology
Requisite Course MTT 101 - Introduction to Conventional and CNC Machining (Active)4.000 - 4.000
Prerequisite
Subject MTT - Machine Tool Technology
Requisite Course MTT 110 - Introduction to CAD/CAM (Active)3.000 - 3.000

Course Content

Lecture
Outline
ORIENTATION Requirements Major Course Review of CNC systems Programming example
Approximate Time In Hours
4.00
Lab
Outline
Insert programs into a CNC machine or simulator using manual data input keyboard and local input.
Approximate Time In Hours
8.00
Lecture
Outline
POINT TO POINT PROGRAMMING FOR MILLS Basic word address commands - review Sequence numbers Feedrate commands Spindle speed commands Miscellaneous functions Tool select commands Drilling Straight line milling 2 Axis Control Manual or mechanical Programmed
Approximate Time In Hours
4.00
Lecture
Outline
CONTINUOUS PATH PROGRAMMING FOR MILLS Linear interpolation Cutter offsets 2 axes 3 axes Circular interpolation Arc center offsets (incremental) Arc center offsets (absolute) Complete circles
Approximate Time In Hours
6.00
Lecture
Outline
COMPUTER AIDED MANUAL NUMERICAL CONTROL PROGRAMMING Text editor Input and output Screen plotting Geometry solution Simulator
Approximate Time In Hours
4.00
Lecture
Outline
MACHINE OPERATIONS Program input Fixture setup Tool setting Program editing Control panels
Approximate Time In Hours
4.00
Lecture
Outline
EXTENDED WORD ADDRESS FORMAT PROGRAMMING RS 274C Description Program entries Tool length offsets Part and fixture offsets R planes Z axis canned cycles Special mill cycles Repetitive programming Loops Macros Subroutines Subprograms Cutter diameter compensation Mirror image Metric programming Polar coordinate programming Scaling, rotation and transformation
Approximate Time In Hours
4.00
Lecture

Outline
THREE AXIS PROGRAMMING Plane and slopes Z axis circular interpolation Scallops and cusps Keller Spiral Tooling and fixtures Quick change tooling Pre-set tooling Automatic tool changer Workholding methods
Approximate Time In Hours
4.00
Lab
Outline
CONTINUOUS PATH PROGRAMMING FOR MILLS Linear interpolation Cutter offsets 2 axes 3 axes Circular interpolation Arc center offsets (incremental) Arc center offsets (absolute) Complete circles
Approximate Time In Hours
6.00
Lecture
Outline
CNC LATHE PROGRAMMING Machine types Lathe axes Programming entries Tool commands Tool length offsets Tool tip Turret center Spindle speeds Direct Constant surface speed Feeds Diameter versus radius programming Absolute versus incremental Facing operations Turning operations Linear and circular interpolation Arc center offsets (I, K and R) Roughing cycles
Approximate Time In Hours
3.00
Lecture
Outline
BORING OPERATIONS Drilling operations Cutter path problems Threading cycles
Approximate Time In Hours
3.00
Lab
Outline
Operate the local data input text input editor on a CNC machine or simulator in the command and text modes to create or alter programs.
Approximate Time In Hours
8.00
Lab
Outline
Write word address programs for a three axis milling machine using linear and circular interpolation.
Approximate Time In Hours
8.00
Lab
Outline
Write word address programs using repetitive routines, loops and macro subroutines.
Approximate Time In Hours
8.00
Lab
Outline
Write CNC programs in the extended word address format using polar coordinates, cutter diameter compensation, scaling and cutter path transformation.
Approximate Time In Hours

8.00
Lab
Outline
Write word address programs to perform simple contouring machining operations on a CNC lathe.
Approximate Time In Hours
8.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Write word address programs for a three axis milling machine using linear and circular interpolation, canned cycles, special Mill cycles, mirror image and metric capabilities.
Insert programs into a CNC machine or simulator using manual data input keyboard and local input.
Operate the local data input text input editor on a CNC machine or simulator in the command and text modes to create or alter programs.
Write word address programs using repetitive routines, loops and macro subroutines.
Write CNC programs in the extended word address format using polar coordinates, cutter diameter compensation, scaling and cutter path transformation.
Write word address programs to perform simple contouring machining operations on a CNC lathe.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1. SLO #1 - Student will be able to insert programs into a CNC machine or simulator using manual data input keyboard and local
input.

2. SLO #2 - Student will be able to write a word address program for a three axis milling machine using linear and circular interpolation.

3. SLO #3 - Instructor will provide the student with a written program and the student will be able to read and explain each line of code.

Methods of Instruction

Demonstration
Demonstrate lecture and lab content related to course description and content; to fulfill Course Objectives and SLO's.
Discussion
Laboratory
Involve students with different hands-on lab assignments related to course description and content; to fulfill Course Objectives and SLO's.
Lecture
Lecture on topics related to course description and content; to fulfill Course Objectives and SLO's.
Multimedia presentations
Using the overhead projector, utilize video and PowerPoint presentation content related to course description and content; to fulfill Course Objectives and SLO's.

Simulation

Methods of Evaluation

Problem solving demonstrations (computational or non-computational)
Skills demonstrations
Exams/Quizzes
If you selected "Other", please provide details.
0

Typical Assignments

Some assignments require critical thinking:
Given an engineering drawing, write a numerical control program for the milling machine using the G and M codes that would produce the part within the tolerances specified. Submit program to instructor for evaluation.

Create a complete program that includes a job plan, tool list, machine tool manuscript, fixture sketch and machine tool setup instructions for the HAAS machining center. Submit program to instructor for evaluation.

Other Assignments:
Create a complete program model for a CNC milling machine. Include the following: written job plan, written tool descriptions, machine tool manuscript and machine tool setup instructions. Submit program model to instructor for evaluation.

Course Materials

Author: Rick Calverley
Title: CNC Programmer's Guide
Publisher: The Goodheart-Willcox Company, Inc.
ISBN-13: 978-1-63776-702-3
Year: 2024
Or Equivalent: No
Author: Titans of CNC and Autodesk
Title: Fundamentals of CNC Machining
Publisher: Autodesk, Inc.
ISBN-13: 978-0-615-50059-1
Year: 2012
Rationale for older textbook:
Although Fundamentals of CNC Machining was published in 2012, it remains highly relevant for teaching core CNC programming concepts. Developed with Autodesk, it aligns with modern tools like Fusion 360 and covers essential topics such as contouring, canned cycles, cutter compensation, and macro

programming. Its free, open-access format makes it ideal for community college students, and current materials and software will be used to supplement any outdated content.
Or Equivalent: No
Author: Haas Automation, Inc.
Title: Mill Programming Workbook – Haas Automation
Publisher: Haas Automation, Inc.
Year: 2015
Rationale for older textbook:
The Mill Programming Workbook by Haas Automation, though published in 2015, remains highly relevant for teaching foundational CNC programming. Haas machines and G-code standards have not changed significantly in this context, and the workbook continues to accurately reflect programming practices used in industry. As a free resource developed by a major CNC manufacturer, it provides clear, practical instruction aligned with real-world applications.
Or Equivalent: No
Author: William Luggen
Title: FUNDAMENTALS OF NUMERICAL CONTROL
Publisher: Delmar
Year: 1994
Rationale for older textbook:
(Industry Standard)
Or Equivalent: Yes
Other:
Removable memory media
Other:
Calculator

Minimum Qualification

1. Machine Tool Technology
Condition

Two Year CTE Course Review – Update Prerequisites; SLO Update -- MTT 115 – Numerical Control Graphics Programming

Course Information

Course Discipline: MTT
Course Division: Business and Industrial Studies
Course Number: 115
Full Course Title: Numerical Control Graphics Programming
Short Title: NC Graphics Prog.
TOP Code: 095630 - Machining and Machine Tools
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status B - Transferable to CSU only.
Effective Term: Fall 2019
Board of Trustees Approval Date:
2017-06-19

Course Description

This basic course covers Computer Aided Manufacturing (CAM), emphasizing interactive graphics programming for Numerical Control (NC) machines. Concepts studied will include interactive geometry construction, tool motion, machine functions, repetitive programming, graphic output and graphic editing. Programs will be compiled using interactive graphics computer systems.

Course Standards

Lecture Hours:
36.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
36.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
2.000
Activity Units:
0.000
Lab Units:
1.000
Min/Max Units:
3.000
Total Hours:
90.000
Grading Method:
Letter grade only

Course Requirements

Prerequisite
Subject MTT - Machine Tool Technology
Requisite Course MTT 101 - Introduction to Conventional and CNC Machining (Active)4.000 - 4.000
Prerequisite
Subject MTT - Machine Tool Technology
Requisite Course MTT 110 - Introduction to CAD/CAM (Active)3.000 - 3.000

Course Content

Lecture
Outline
COMPUTER AIDED NUMERICAL CONTROL (CNC) PROGRAMMING OVERVIEW Software demonstration Overview of software workspace
Approximate Time In Hours
3.00
Lab
Outline
CNC PROGRAMMING OVERVIEW Sketching basic geometry Exploring software
Approximate Time In Hours
4.00
Lecture
Outline
OVERVIEW OF THE GRAPHIC PROGRAMMING PROCESS (Milling Machining Process) Planning operations Tooling
Approximate Time In Hours
3.00
Lab
Outline
OVERVIEW OF THE GRAPHIC PROGRAMMING PROCESS (Milling Machining Process) Planning operations Tooling
Approximate Time In Hours
5.00
Lecture
Outline
CREATION OF GEOMETRY Points Holes Lines Arcs
Approximate Time In Hours
3.00
Lab
Outline
CREATION OF GEOMETRY Points Holes Lines Arcs
Approximate Time In Hours
6.00
Lecture
Outline
MAKING CORRECTIONS AND ADDING TO GRAPHIC MODEL OF MACHINING PROCESS Edit, modify geometry Transform toolpath
Approximate Time In Hours
3.00
Lab
Outline
MAKING CORRECTIONS AND ADDING TO GRAPHIC MODEL OF MACHINING PROCESS Edit, modify geometry Transform toolpath
Approximate Time In Hours
5.00

Lecture
Outline
ROUGHING (Milling Process) Pocketing Contouring
Approximate Time In Hours
3.00
Lab
Outline
ROUGHING (Milling Process) Pocketing Contouring
Approximate Time In Hours
5.00
Lecture
Outline
CONVERTING CAD DATABASES TO TOOLPATH Examining part - verifying data Establishing part origin
Approximate Time In Hours
3.00
Lab
Outline
CONVERTING CAD DATABASES TO TOOLPATH Examining part - verifying data Establishing part origin
Approximate Time In Hours
4.00
Lecture
Outline
SHORTCUTS Repetitive programming Sub programming
Approximate Time In Hours
3.00
Lab
Outline
SHORTCUTS Repetitive programming Sub programming
Approximate Time In Hours
4.00
Lecture
Outline
MISCELLANIOUS TOPICS Utilities Creation of splines
Approximate Time In Hours
3.00
Lab
Outline
MISCELLANIOUS TOPICS Utilities Creation of splines
Approximate Time In Hours
4.00
Lecture
Outline
LATHE PLANNING, TOOLING Overview of graphics programming of lathe Stock set up
Approximate Time In Hours

3.00
Lab
Outline
LATHE PLANNING, TOOLING Overview of graphics programming of the lathe Stock set up
Approximate Time In Hours
5.00
Lecture
Outline
CUSTOMIZATION Communicating with machine tools Adding toolbar states
Approximate Time In Hours
3.00
Lab
Outline
CUSTOMIZATION Communicating with machine tools Adding toolbar states
Approximate Time In Hours
4.00
Lecture
Outline
LATHE CYCLES Rough Groove Thread
Approximate Time In Hours
3.00
Lab
Outline
LATHE CYCLES Rough Groove Thread
Approximate Time In Hours
4.00
Lecture
Outline
INTRODUCTION TO CONTROLLING CODE OUTPUT Post processors Machining definition
Approximate Time In Hours
3.00
Lab
Outline
INTRODUCTION TO CONTROLLING CODE OUTPUT Post processors Machine definition
Approximate Time In Hours
4.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Utilize computer operating systems to manipulate files and obtain listings and graphic plots.
Create geometric elements such as points, lines, circles and splines using interactive graphic techniques.
Convert geometry from Computer Aided Drafting (CAD) databases to numerical control part geometry.
Create tool motion routines including: turning, boring, drilling, profiling, pocket roughing and turning, using interactive graphic techniques.
Edit geometry, tooling statements and tool motion routines using interactive graphic techniques.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1. SLO 1. Tool Motion Routines Students will be able to create, manipulate and edit tool motion routines including: turning, boring, drilling, profiling, pocket roughing and turning, using interactive graphic techniques.

2. SLO 2. Students will be able to utilize computer operating systems to manipulate files, convert geometry from CAD databases to numerical control part geometry.

3. SLO 3. Upon successful completion of this course, students will be able to create and edit basic NC programs using interactive Computer-Aided Manufacturing (CAM) software, including geometry construction, toolpath generation, and simulation for CNC machine operations.

Methods of Instruction

Demonstration
Discussion
Laboratory
Using a Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) software package, students will perform part creation from conception to conclusion. Practice and demonstrate proper toolpath creation.
Lecture
Speak in detail on the subject of interactive graphics programming for Numerical Control (NC) machines.to create and meet the detailed specifications given in engineered drawings.
Multimedia presentations
Simulation

Methods of Evaluation

Skills demonstrations
Exams/Quizzes

Typical Assignments

Some assignments require critical thinking:
Provided with a CAD database for a mechanical part to be manufactured, convert the CAD data to NC geometry. Submit NC geometry on a CAD file to the instructor.

Given an engineering drawing of a mechanical part, create and submit a three-dimensional (3D) CAD mechanical drawing of the part on manufacturing software.

Other Assignments:

Create a manufacturing process model for a compressor mounting bracket to be fabricated on a CNC milling machine. The process model will include a list of operations, tools, manuscript, process sheet, fixtures, drawings and tool list. Submit a 45 page process model electronically to the instructor.

Course Materials

Author: Rick Calverley
Title: CNC Programmer's Guide
Publisher: The Goodheart-Willcox Company, Inc.
ISBN-13: 978-1-63776-702-3
Year: 2024
Or Equivalent: No
Author: Titans of CNC and Autodesk
Title: Fundamentals of CNC Machining
Publisher: Autodesk, Inc.
ISBN-13: 978-0-615-50059-1
Year: 2012
Rationale for older textbook:
Although Fundamentals of CNC Machining was published in 2012, it remains highly relevant for teaching core CNC programming concepts. Developed with Autodesk, it aligns with modern tools like Fusion 360 and covers essential topics such as contouring, canned cycles, cutter compensation, and macro programming. Its free, open-access format makes it ideal for community college students, and current materials and software will be used to supplement any outdated content.
Or Equivalent: No
Author: Haas Automation, Inc.
Title: Mill Programming Workbook – Haas Automation
Publisher: Haas Automation, Inc.
Year: 2015
Rationale for older textbook:
The Mill Programming Workbook by Haas Automation, though published in 2015, remains highly relevant for teaching foundational CNC programming. Haas machines and G-code standards have not changed significantly in this context, and the workbook continues to accurately reflect programming practices used in industry. As a free resource developed by a major CNC manufacturer, it provides clear, practical instruction aligned with real-world applications.
Or Equivalent: No
Author: Matthew Manton
Title: MASTERCAM X9 TRAINING TUTORIALS - MILL 2D
Publisher: CamInstructor
Year: 2014
Rationale for older textbook:
(Industry Standard)
Or Equivalent: No
Other:
Removable memory media

Minimum Qualification

1. Machine Tool Technology
Condition

Two Year CTE Course Review – Update Prerequisites; SLO Update -- MTT 118 – 3D Numerical Control Graphics Programming

Course Information

Course Discipline: MTT
Course Division: Business and Industrial Studies
Course Number: 118
Full Course Title: 3D Numerical Control Graphics Programming
Short Title: 3D NC Graphics Prog.
TOP Code: 095630 - Machining and Machine Tools
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status B - Transferable to CSU only.
Effective Term: Fall 2019

Course Description

This course covers Computer Aided Manufacturing (CAM), emphasizing interactive graphics programming for Numerical Control (NC) machines. Students will utilize various techniques of creating geometry on multiple work planes, three dimensional (3D) surface toolpath creation and manipulation, implementing 4th and 5th axis machining, generating surface to surface intersections, creating blends between surfaces, creating roughing operations for 3D and Computer Aided Design (CAD) data conversion for the purpose of 3D machining.

Course Standards

Lecture Hours:
36.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
36.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
2.000
Activity Units:
0.000
Lab Units:
1.000
Min/Max Units:
3.000
Total Hours:
90.000
Grading Method:
Letter grade only

Course Requirements

Prerequisite
Subject MTT - Machine Tool Technology
Requisite Course MTT 115 - Numerical Control Graphics Programming (Active)3.000 - 3.000

Course Content

Lecture
Outline
ORIENTATION AND REVIEW Review of numerical control and computer aided manufacturing with emphasis on graphics programming Course requirements
Approximate Time In Hours
2.00
Lecture
Outline
2D VERSUS 3D FUNCTIONS Translate 3D Geometry between planes
Approximate Time In Hours
2.00
Lecture
Outline
WORKPLANES AND THEIR OPERATION Construction planes Tool planes
Approximate Time In Hours
4.00
Lecture
Outline
OVERVIEW OF 3D GEOMETRY FOR 3D SURFACES Considerations for beginning surface model Geometry Surfaces
Approximate Time In Hours
4.00
Lecture
Outline
MACHINING OF 3D SURFACE MESHES Roughing operations Finishing operations
Approximate Time In Hours
2.00
Lecture
Outline
CREATING SURFACE MESHES Geometrical surfaces Free form surfaces
Approximate Time In Hours
3.00
Lecture
Outline
CAD DATABASE CONVERSION AS RELATES TO 3D Standard for the Exchange of Product Model Data (STEP) Initial Graphics Exchange Standard (IGES) Neutral File Format (NATIVE)
Approximate Time In Hours
3.00
Lecture
Outline
EDITING AND BLENDING SURFACE MESHES, ROUGHING OPERATIONS FOR 3D Fillet surfaces Blend surfaces
Approximate Time In Hours
4.00
Lab

Outline
ORIENTATION AND REVIEW Review of numerical control and computer aided manufacturing Review of graphics programming
Approximate Time In Hours
3.00
Lab
Outline
2D VERSUS 3D FUNCTIONS Translate 3D Geometry between planes
Approximate Time In Hours
3.00
Lab
Outline
WORKPLANES AND THEIR OPERATION Construction planes Tool planes
Approximate Time In Hours
6.00
Lab
Outline
OVERVIEW OF 3D GEOMETRY FOR 3D SURFACES Considerations for beginning surface model Geometry Surfaces
Approximate Time In Hours
6.00
Lab
Outline
CREATING SURFACE MESHES Geometrical surfaces Free form surfaces
Approximate Time In Hours
7.00
Lab
Outline
MACHINING OF 3D SURFACE MESHES Roughing operations Finishing operations
Approximate Time In Hours
3.00
Lab
Outline
EDITING AND BLENDING SURFACE MESHES, ROUGHING OPERATIONS FOR 3D Fillet surfaces Blend surfaces
Approximate Time In Hours
6.00
Lab
Outline
CAD DATABASE CONVERSION AS RELATES TO 3D STEP (Standard for the Exchange of Product Model Data) IGES (Initial Graphics Exchange Standard) NATIVE (neutral file format)
Approximate Time In Hours
4.00
Lecture
Outline
4th AND 5th AXIS MACHINING 5 axis drill path 5 axis milling path

Approximate Time In Hours
3.00
Lab
Outline
4th AND 5th AXIS MACHINING 5 axis drill path 5 axis milling path
Approximate Time In Hours
4.00
Lecture
Outline
SIMULTANEOUS ROTARY MACHINING Axis substitute Rotary positioning
Approximate Time In Hours
3.00
Lab
Outline
SIMULTANEOUS ROTARY MACHINING Axis substitute Rotary positioning
Approximate Time In Hours
4.00
Lecture
Outline
PROGRAMMING SHORTCUTS, CUSTOMIZATION Post processors Machine definition
Approximate Time In Hours
3.00
Lab
Outline
PROGRAMMING SHORTCUTS, CUSTOMIZATION Post processors Machine definition
Approximate Time In Hours
4.00
Lab
Outline
CODE GENERATION CONSIDERATIONS FOR 3D Step over amount Scallop height
Approximate Time In Hours
4.00
Lecture
Outline
CODE GENERATION CONSIDERATIONS FOR 3D Step over amount Scallop height
Approximate Time In Hours
3.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Differentiate between two dimensional (2D) and 3D functions.
Construct appropriate profile geometry on which to base 3D surfaces and to recognize what surface type would be required.
Create 3D surfaces as toolpath or non-toolpath geometry.
Describe and demonstrate appropriate 3D editing operations.

Use 4th and 5th axis positioning and simultaneous rotary axis machining operations on 3D process models. Practice roughing of 3D surfaces, code generation and CAD database conversion as it relates to 3D modeling of the machining process.
Select and modify post processors to edit existing code.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1. **SLO 1 – 3D Geometry and Toolpath Creation Upon successful completion of this course, students will be able to** construct 3D part geometry across multiple work planes and generate corresponding 3D toolpaths for CNC machining using CAM software.

- **Apply** (using CAM software to create toolpaths)
- **Understand** (interpreting multi-plane geometry)

2. **SLO 2 – Multiaxis Machining Strategies Upon successful completion of this course, students will be able to** develop and implement 4-axis and 5-axis machining strategies, including surface-to-surface intersections and blend creation for complex part geometries.

- **Apply** (implementing multiaxis strategies)
- **Analyze** (understanding surface interactions and blend techniques)
- **Create** (designing complex multiaxis toolpaths)

3. **SLO 3 – CAD/CAM Data Integration Upon successful completion of this course, students will be able to** convert CAD models into machinable formats and create optimized roughing operations for 3D manufacturing applications.

- **Apply** (converting and executing operations)
- **Create** (developing optimized toolpaths from CAD models)

Methods of Instruction

Demonstration
Discussion
Laboratory
Lecture
Multimedia presentations
Simulation

Methods of Evaluation

Skills demonstrations
Exams/Quizzes

Typical Assignments

Some assignments require critical thinking:
Provided with 3D wireframe CAD drawing, on CNC software, correct surface types, create a surface rough, finish toolpath and post for Haas CNC machining center g-code program.

Develop complete manufacturing procedures on CNC software for a CNC turning center operation, including tool descriptions and setup instructions.

Other Assignments:
Create a 3 axis process model to be manufactured on a CNC machining center from the engineering specifications provided.

Course Materials

Author: Titans of CNC and Autodesk
Title: Fundamentals of CNC Machining
Publisher: Autodesk, Inc.
ISBN-13: 978-0-615-50059-1
Year: 2012
Rationale for older textbook:
Although Fundamentals of CNC Machining was published in 2012, it remains highly relevant for teaching core CNC programming concepts. Developed with Autodesk, it aligns with modern tools like Fusion 360 and covers essential topics such as contouring, canned cycles, cutter compensation, and macro programming. Its free, open-access format makes it ideal for community college students, and current materials and software will be used to supplement any outdated content.
Or Equivalent: No
Author: Haas Automation, Inc.
Title: Mill Programming Workbook – Haas Automation
Publisher: Haas Automation, Inc.
Year: 2015
Rationale for older textbook:
The Mill Programming Workbook by Haas Automation, though published in 2015, remains highly relevant for teaching foundational CNC programming. Haas machines and G-code standards have not changed significantly in this context, and the workbook continues to accurately reflect programming practices used in industry. As a free resource developed by a major CNC manufacturer, it provides clear, practical instruction aligned with real-world applications.
Or Equivalent: No
Author: Rick Calverley
Title: CNC Programmer's Guide
Publisher: The Goodheart-Willcox Company, Inc.
ISBN-13: 978-1-63776-702-3
Year: 2024
Or Equivalent: No

Other:
Removable memory media

Minimum Qualification

1. Machine Tool Technology
Condition

Two Year CTE Course Review – Update Prerequisites; SLO Update – MTT 140 – Machine Shop Calculations

Course Information

Course Information

Course Discipline: MTT
Course Division: Business and Industrial Studies
Course Number: 140
Full Course Title: Machine Shop Calculations
Short Title: Machine Shop Calcs
TOP Code: 095630 - Machining and Machine Tools
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status B - Transferable to CSU only.
Effective Term: Fall 2020
Board of Trustees Approval Date:
2020-09-08

Course Description

This course covers the study of machine shop problems involving the solution of formulas related to screw threads, feeds and speeds, spur gears, simple and angular indexing. Geometric figures, angles, triangles, circles, arcs, trigonometric functions, compound angles and oblique triangles will also be introduced.

Course Standards

Lecture Hours:
54.000
Activity Hours:
0.000
Lab Hours:
Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
54.000
Activity Hours:
0.000
Lab Hours:

Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
3.000
Activity Units:
0.000
Lab Units:

Min/Max Units:
3.000
Total Hours:
54.000
Grading Method:
Letter grade only

Course Requirements

Recommended Prep - Courses
Subject MTT - Machine Tool Technology
Requisite Course MTT 120 - Manufacturing Print Reading (Active)3.000 - 3.000

Course Content

Lecture
Outline
Introduction to Shop Math and Fraction Fundamentals. Define the role of math in machining and manufacturing. Review whole numbers and explore the meaning and structure of fractions. Identify

proper, improper, and mixed fractions, and explain their use in reading tape measures and part dimensions.
Approximate Time In Hours
3.00
Lecture
Outline
Operations with Fractions and Mixed Numbers. Add, subtract, multiply, and divide fractions in the context of real machining tasks. Convert between mixed numbers and improper fractions. Apply skills to tooling adjustments, part stacking, and material dimensions.
Approximate Time In Hours
3.00
Lecture
Outline
Decimal Notation and Fraction Conversion. Explain decimal place values and rounding conventions. Convert between fractions and decimals and perform basic decimal operations. Relate concepts to precision measurement using digital calipers and micrometers.
Approximate Time In Hours
3.00
Lecture
Outline
Rounding, Tolerances, and Estimations. Apply rounding techniques to measurements and quantities. Define and interpret tolerances in machining prints. Estimate values and perform quick calculations relevant to shop decision-making.
Approximate Time In Hours
3.00
Lecture
Outline
Percentages, Ratios, and Their Applications. Define percentages and ratios and apply them to shop tasks. Calculate percent changes in material usage and part yield. Analyze gear ratios, material scrap, and efficiency metrics.
Approximate Time In Hours
3.00
Lecture
Outline
Measurement Systems and Reading a 6" Scale. Differentiate between imperial and metric systems. Practice reading a 6" rule and understanding fractional graduations. Convert between inches and millimeters using simple conversions.
Approximate Time In Hours
3.00
Lecture
Outline
Blueprint Dimensions and Tolerances. Identify dimension types on blueprints and explain how to extract dimensional data. Introduce tolerance zones and methods for calculating permissible limits. Apply concepts to visual part inspection and verification.
Approximate Time In Hours
3.00

Lecture
Outline
Drill Point Angles and Depth Calculations. Review twist drill anatomy and common point angles. Use trig-based formulas to determine drill point length. Apply calculations to machine setup and countersink depth estimation.
Approximate Time In Hours
3.00
Lecture
Outline
Micrometer Reading and Decimal Measurement. Interpret micrometer readings and compare them with digital measuring tools. Practice converting micrometer values into decimal notation and using them for dimensional verification.
Approximate Time In Hours
3.00
Lecture
Outline
Feedrate and RPM Calculations for Machining. Introduce standard machining formulas to calculate spindle speed (RPM) and feedrates. Identify key variables (surface speed, tool diameter, feed per tooth) and apply them to shop examples.
Approximate Time In Hours
3.00
Lecture
Outline
Unit Conversions and Dimensional Analysis. Perform dimensional conversions between inches, feet, millimeters, and centimeters. Use conversion factors in material ordering, tool selection, and part verification.
Approximate Time In Hours
3.00
Lecture
Outline
Introduction to Geometry for Machining. Review lines, angles, and triangle types used in layout and inspection. Define right, acute, and obtuse angles and describe geometric reasoning in part alignment and squaring setups.
Approximate Time In Hours
3.00
Lecture
Outline
Pythagorean Theorem and Layout Applications. Apply $a^2 + b^2 = c^2$ to solve layout problems in squareness, diagonal measurement, and fixturing. Connect calculations to common layout and inspection routines.
Approximate Time In Hours
3.00
Lecture
Outline
Perimeter, Area, and Volume for Stock Estimation. Calculate perimeter and area of rectangular, circular, and triangular shapes. Estimate volume of stock materials for job planning and cost estimation.
Approximate Time In Hours

3.00
Lecture
Outline
Basic Trigonometry for Layout and Machining. Define sine, cosine, and tangent functions in relation to right triangles. Use SOH-CAH-TOA to solve for unknown angles or sides. Apply calculations to bolt circle layouts and compound angles.
Approximate Time In Hours
6.00
Lecture
Outline
Final Review and Blueprint-Based Applications. Review all major course topics through integrated examples. Work with blueprints and real shop scenarios to apply math skills from the semester. Prepare for final exam or project.
Approximate Time In Hours
6.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Lecture
Perform arithmetic operations using whole numbers, fractions, and decimals as applied to common manufacturing and machining tasks.
Lecture
Convert between fractional, decimal, and metric units and apply these conversions in blueprint interpretation and measurement tasks.
Lecture
Interpret shop measurements and tolerances using rulers, calipers, micrometers, and print annotations.
Lecture
Solve applied shop math problems involving percentages, ratios, and proportions, including material yield and tool life.
Lecture
Use measurement tools and read part dimensions accurately, including identifying tolerances and understanding the impact on production.
Lecture
Apply geometric concepts including lines, angles, and triangles to layout and part inspection tasks in a manufacturing setting.
Lecture
Use the Pythagorean Theorem to solve right triangle problems related to machine setup, layout, and fixture design.
Lecture
Calculate perimeter, area, and volume of common shapes to estimate material usage and support planning and purchasing decisions.
Lecture
Apply machining formulas (e.g., RPM, feedrate, surface speed) to select appropriate cutting parameters based on material and tooling.
Lecture

Use basic trigonometry (sine, cosine, tangent) to solve machining layout problems such as bolt circle patterns, tapers, and angled cuts.
Lecture
Interpret and use dimensional data from blueprints to guide manufacturing decisions, including spot-checking parts and planning operations.
Lecture
Demonstrate the ability to solve multi-step math problems using shop-relevant formulas and order of operations.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1.

SLO 1 – Fractional Math and Measurement Interpretation

Outcome: Upon successful completion of this course, students will be able to interpret fractional and decimal dimensions from technical documentation and perform accurate arithmetic operations to solve common shop-related math problems.
Bloom's Level:

- Apply (solving fraction/decimal-based problems in manufacturing scenarios)
- Understand (interpreting measurement data and blueprint callouts)

2.

SLO 2 – Speed and Feed Calculations for Machining Operations

Outcome: Upon successful completion of this course, students will be able to apply industry-standard formulas to calculate spindle speed (RPM), cutting speed, and feed rate based on material type, cutter diameter, and machining conditions.
Bloom's Level:

- Apply (using formulas to determine speeds and feeds for machining)
- Understand (recognizing the relationship between variables in machining equations)

3.

SLO 3 – Application of Geometry and Trigonometry in Machining Layouts

Outcome: Upon successful completion of this course, students will be able to apply geometric principles and basic trigonometric functions to solve layout and positioning problems in machining environments.
Bloom's Level:

- Apply (solving bolt circle patterns, tapers, and angled features using trig)
- Analyze (evaluating layout setups and verifying dimensional relationships)

Methods of Instruction

Lecture
Lecture on topics related to Calculations used in a Machine Shop.
Multimedia presentations
Using the overhead projector, utilize video and PowerPoint presentations on topics related to Calculations used in a Machine Shop.

Methods of Evaluation

Problem solving demonstrations (computational or non-computational)
Exams/Quizzes

Typical Assignments

Some assignments require critical thinking:
A tool and die maker grinds a pin to an 18.25 millimeter diameter. The pin is to be pressed (an interference fit) in a hole. The minimum interference allowed is 0.03 millimeter. The maximum interference allowed is 0.07 milimeter. Determine the mean diameter of the hole. Write calculations on a one page-report and submit to the instructor for evluation.

A machine produces 2,550 parts in 8.5 hours. How many parts are produced by the machine in 10 hours? Write calculations on a one-page report and submit to the instructor for evaluation.

Other Assignments:
Three cuts are required to turn a steel shaft. The depths of the cuts, in millimeters, are 6.25, 3.18, and 0.137. How much stock has been removed per side? Write calculations on a one-page report and submit to the instructor for evaluation.

Course Materials

Author: Mark W. Huth
Title: Math for Machinists
Edition: 1st
Publisher: G-W
ISBN-13: 978-1-63563-218-7
Year: 2019
Or Equivalent: No
Author: Chad Flinn and Mark Overgaard
Title: Math for Trades
Publisher: BCcampus
ISBN-13: 978-1-77420-061-2
Year: 2020
Rationale for older textbook:

This 2020 open textbook is specifically designed for trades students, with clear explanations of shop-relevant math like measurement, geometry, and trigonometry. It supports Compton College's goals for equity and affordability while aligning with industry standards. As an OER, it also allows for easy customization to fit course needs and helps students develop critical thinking and problem-solving skills essential for technical careers.
Or Equivalent: No
Author: Chad Flinn and Mark Overgaard
Title: Math for Trades: Volume 2
Publisher: BCcampus
ISBN-13: 978-1-77420-113-8
Year: 2021
Or Equivalent: No
Author: Christopher Mc Cauley
Title: MACHINERY'S HANDBOOK POCKET COMPANION
Edition: 31
Publisher: Industrial Press
ISBN-13: 9780831137311
Year: 2020
Or Equivalent: No
Other:
Scientific calculator with trigonometric functions
Other:
Notebook
Other:
Protractor
Other:
Triangle

Minimum Qualification

1. Machine Tool Technology
Condition

2. Manufacturing Technology
Condition

Two Year CTE Course Review – SLO Update – MTT 107 – Advanced Manufacturing Processes

Course Information

Course Information

Course Discipline: MTT
Course Division: Business and Industrial Studies
Course Number: 107
Full Course Title: Advanced Manufacturing Processes
Short Title: Adv Manufacturing Processes
TOP Code: 095630 - Machining and Machine Tools
SAM Code: B - Advance Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status B - Transferable to CSU only.
Effective Term: Fall 2021
Board of Trustees Approval Date:
2021-03-16

Course Description

In this course, students will study the principles and operation of machine tools with an emphasis on advanced manufacturing processes and machines, such as Electrical Discharge Machines (EDM), water abrasive jet machines, and grinding machines. Additional topics will include abrasives, coordinate measuring machines, advanced precision measurement, Geometric Dimensioning and Tolerancing (GD&T), optical comparators, and practices and setups as applied in industry. Note: Letter grade or pass/no pass option.

Course Standards

Lecture Hours:
54.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
54.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
3.000
Activity Units:
0.000
Lab Units:
1.000
Min/Max Units:
4.000
Total Hours:
108.000
Grading Method:
Both - Letter with Pass/No Pass Option

Course Requirements

Prerequisite
Subject MTT - Machine Tool Technology
Requisite Course MTT 101 - Introduction to Conventional and CNC Machining (Active)4.000 - 4.000
Prerequisite
Subject MTT - Machine Tool Technology
Requisite Course MTT 146 - Basic Machine Tool Operation (Active)3.000 - 3.000
Other

Non Course Requirements
equivalent

Course Content

Lecture
Outline
SafetyA. Machine tool technology analysisB. Safe shop practices in metalworkingC. Hand tool and benchworkD. Safety test
Approximate Time In Hours
6.00
Lab
Outline
SafetyA. Machine tool technology analysisB. Safe shop practices in metalworkingC. Hand tool and bench workD. Safety test
Approximate Time In Hours
6.00
Lecture
Outline
Basic Machining and Supplemental ProcessesA. MeasurementB. Basic latheC. Basic milling machinesD. Basic grindingE. Print readingF. Procedures
Approximate Time In Hours
6.00
Lab
Outline
Review of Machining and Supplemental ProcessesA. MeasurementB. LatheC. Milling machinesD. GrindingE. Print readingF. Procedures
Approximate Time In Hours
6.00
Lecture
Outline
Grinding Operations A. Surface grindingB. Cylindrical grindingC. Tool and cutter grinding
Approximate Time In Hours
6.00
Lab
Outline
Grinding OperationsA. Surface grindingB. Cylindrical grindingC. Tool and cutter grinding
Approximate Time In Hours
6.00
Lecture
Outline
Abrasives A. CoatedB. Bonded
Approximate Time In Hours
6.00
Lab
Outline

AbrasivesA. CoatedB. Bonded
Approximate Time In Hours
6.00
Lecture
Outline
Advanced Precision MeasurementA. Coordinate measuring machineB. Optical comparatorC. Hardness testingD. Cylindrical squareE. Vernier protractorF. Fixed gages
Approximate Time In Hours
6.00
Lab
Outline
Advanced Precision MeasurementA. Coordinate measuring machineB. Optical comparatorC. Hardness testingD. Cylindrical squareE. Vernier protractorF. Fixed gages
Approximate Time In Hours
6.00
Lecture
Outline
Applied TrigonometryA. Sine bars and platesB. Gage blocksC. Engineering drawing applications
Approximate Time In Hours
6.00
Lab
Outline
Applied TrigonometryA. Sine bars and platesB. Gage blocksC. Engineering drawing applications
Approximate Time In Hours
6.00
Lecture
Outline
Geometric Dimensioning and Tolerancing (GD&T)A. General rulesB. DatumsC. Modifiers
Approximate Time In Hours
6.00
Lab
Outline
Geometric Dimensioning and Tolerancing (GD&T)A. General rulesB. DatumsC. Modifiers
Approximate Time In Hours
6.00
Lecture
Outline
Electrical Discharge Machines (EDM)A. Cutting process and proceduresB. Dielectric fluidsC. Overcut and tolerancesD. SinkerE. Wire
Approximate Time In Hours
6.00
Lab
Outline
Electrical Discharge Machines (EDM)A. Cutting process and proceduresB. Dielectric fluidsC. Overcut and tolerancesD. SinkerE. Wire
Approximate Time In Hours

6.00
Lecture
Outline
Abrasive Water Jet MachinesA. Cutting process and proceduresB. Stream and kerf widthC. Abrasive typesD. Piercing E. Cutting techniques
Approximate Time In Hours
6.00
Lab
Outline
Abrasive Water Jet MachinesA. Cutting process and proceduresB. Stream and kerf widthC. Abrasive typesD. Piercing E. Cutting techniques
Approximate Time In Hours
6.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Lecture
Correctly apply machine shop safety practices with 100% accuracy
Lab
Correctly use hand tools, measuring tools, layout tools, power saws, drilling machines, engine lathes, and milling machines to perform supplemental machine tool operations on assigned work within the tolerances specified on engineering drawings.
Lab
Select and use cylindrical squares, precision height gauges, vernier bevel protractors, gauge blocks and sine bars to inspect assigned work within the tolerances specified on engineering drawings.
Lecture
Interpret geometrically dimensioned and toleranced engineering drawings to assist in producing assigned work within the tolerances specified on engineering drawings.
Lecture
Solve shop mathematics problems involving trigonometry and its application to sine bars, speeds and feeds, grinding machines, precision measurement, and engineering drawing interpretation.
Lab
Set up and operate surface grinders and cylindrical grinders to produce assigned work within the tolerances specified on engineering drawings.
Lab
Set up and operate a coordinate measuring machine and optical comparator to inspect assigned work within the tolerances specified on engineering drawings.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1. SLO #1 Set up and operate a coordinate measuring machine and optical comparator to inspect assigned work within the tolerances specified on engineering drawings.

2. **SLO # 2** Measuring & Inspection - Students will be able to select and use cylindrical squares, precision height gauges, vernier bevel protractors and gauge blocks to inspect assigned work within the tolerances specified on engineering drawings.

3. **SLO #3** 3d printing and rapid prototyping - Utilize a 3d printer and understand the pros and cons of each rapid prototyping process. Given a list of hypothetical projects, the student should be able to determine the most appropreate prototyping machine for the given specifications.

Methods of Instruction

Demonstration
Demonstrate lecture and lab content related to course description and content; to fulfill Course Objectives and SLO's.
Discussion
Create discussions between students that provoke an analysis of advanced manufacturing processes.
Internet Presentation/Resources
Utilize various internet based resources that are relevant to the course being taught.
Laboratory
Involve students with different hands-on lab assignments related to course description and content; to fulfill Course Objectives and SLO's.
Lecture
Lecture on topics related to course description and content; to fulfill Course Objectives and SLO's.
Multimedia presentations
Using the overhead projector, utilize video and PowerPoint presentation content related to course description and content; to fulfill Course Objectives and SLO's.
Simulation
Demonstrate and involve students with various machine operations using simulation software that emulates industry relevant machinery.

Methods of Evaluation

Problem solving demonstrations (computational or non-computational)
Skills demonstrations
Exams/Quizzes

Typical Assignments

Some assignments require critical thinking:
A matching punch and die are to be produced from a single tool steel plate for stamping the gasket for the robot arm specified in zone B5 of the engineering drawing MS-3006. Calculate the draft angle based on the clearance needed for material thickness of .125". Set up and machine the matched parts on the wire EDM machine and inspect both pieces. Record the measured dimensions on a one-page inspection report form and submit to the instructor for evaluation.

The C-Clamp frame represented on the engineering drawing MS-13 specifies datums and features to be inspected. Set up a machined frame for inspection on a coordinate measuring machine. Measure the

perpendicularity feature by clamping the part on Datum A and measuring the perpendicularity to Datum B. Record the measured perpendicularity on a one-page inspection report and submit to the instructor for evaluation.

Other Assignments:
Design and fabricate a fixture to surface grind the 45 degree angle on the class project "CNC Triangles". Include a quick clamp technique to facilitate grinding 20 parts, one part at a time. Machine the first part and submit to the inspection team for first article approval.

Course Materials

Author: LamNgeun Virasak
Title: Manufacturing Processes 4-5
Publisher: Open Oregon Educational Resources
ISBN-13: 978-1-63635-048-6
Year: 2023
Or Equivalent: No
Author: Stephen F. Krar, Arthur R. Gill and Peter Smid
Title: Technology of Machine Tools
Edition: 7th
Publisher: McGraw Hill
Year: 2011
Rationale for older textbook:
INDUSTRY STANDARD
Or Equivalent: No
Other:
Safety glasses or goggles 2. Steel rule - flexible - 6" 3. Clean shop coat/apron 4. Lathe tool bits - 3/8" square 5. Materials for projects 6. Scientific calculator

Minimum Qualification

1. Machine Tool Technology
Condition

Two Year CTE Course Review – SLO Update – MTT 120 – Manufacturing Print Reading

Course Information

Course Discipline: MTT
Course Division: Business and Industrial Studies
Course Number: 120
Full Course Title: Manufacturing Print Reading
Short Title: Manufacturing Print Reading
TOP Code: 095630 - Machining and Machine Tools
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status B - Transferable to CSU only.
Effective Term: Fall 2020
Board of Trustees Approval Date:
2020-11-17

Course Description

Students are introduced to engineering drawings and engineering specifications used in manufacturing industries. Representative drawings from simple production to complex assembly will be used to demonstrate concepts and for practice in interpreting the symbols and notations. Geometric Dimensioning and Tolerancing (GD&T) in accordance with American National Standards Institute (ANSI) Y-14.5 standard and the construction of simple machine parts are also discussed.

Course Standards

Lecture Hours:
54.000
Activity Hours:
0.000
Lab Hours:
Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
54.000
Activity Hours:
0.000
Lab Hours:

Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
3.000
Activity Units:
0.000
Lab Units:

Min/Max Units:
3.000
Total Hours:
54.000
Grading Method:
Letter grade only

Course Content

Lecture
Outline
Introduction to Blueprint Reading and Industry Applications. Define what blueprints are and explain their purpose in manufacturing. Identify the professionals who use blueprints and describe how each role interprets and applies print information. Differentiate between job functions and the ways blueprints support communication and workflow across industries.
Approximate Time In Hours
3.00
Lecture
Outline

Fundamental Elements of a Manufacturing Blueprint and the Manufacturing Cycle. Identify the three key components of a manufacturing blueprint. Describe the function of title blocks, notes, and standard line types. Explain the stages of the manufacturing cycle and analyze the role blueprints play in guiding each phase, from planning through production and inspection.
Approximate Time In Hours
3.00
Lecture
Outline
Visualization and Projection Fundamentals. Describe the basic requirements of technical drawings and explain the concept of projected views. Identify the differences between orthographic, first-angle, and third-angle projection systems. Recognize how multiple views are arranged in standard formats and interpret how these views represent the shape and structure of a part.
Approximate Time In Hours
3.00
Lecture
Outline
Projection Systems, Standards, and View Interpretation. Differentiate between first-angle and third-angle projection symbols. Apply visualization skills to compare isometric views with corresponding projected views. Identify edges and faces from multiple views and evaluate how technical standards guide the interpretation of part features across various drawing formats.
Approximate Time In Hours
3.00
Lecture
Outline
Line Types, Print Layout, and Scale Interpretation. Identify standard line types used in technical drawings and describe their purpose. Recognize the structural elements of a print, including borders, title blocks, revision history blocks, and the main drawing area. Determine the drawing scale and explain how it affects the interpretation of features and dimensions.
Approximate Time In Hours
3.00
Lecture
Outline
Reading Notes, Title Blocks, and Revision Histories. Interpret general and local notes as they apply to specific drawing areas. Locate and explain the information found in title blocks, revision history blocks, and assembly bills of materials. Identify specific revisions made to drawings and evaluate the impact of these changes on part interpretation.
Approximate Time In Hours
3.00
Lecture
Outline
Orthographic, Auxiliary, and Special View Types. Visualize part geometry using orthographic and auxiliary views. Identify view arrows and labels, and explain their use in navigating complex prints. Interpret specialized views including local, removed, rotated, and detail views, and describe how they contribute to understanding part features.
Approximate Time In Hours
3.00

Lecture
Outline
Section Views and Drawing Simplifications. Interpret section views using various cutting plane line conventions. Distinguish between removed sections, rotated sections, and broken-out sections. Evaluate how interrupted views and simplified representations of repetitive features are used in technical drawings to communicate detail efficiently.
Approximate Time In Hours
3.00
Lecture
Outline
Fundamentals of Dimensioning and Geometric Interpretation. Define the purpose of dimensions and identify the components of a dimension annotation. Interpret dimension symbols and describe how dimensions relate to geometric features. Distinguish between linear, diametral, radial, and angular dimensions in both English and metric systems. Recognize reference dimensions and explain their meaning in the context of part inspection or fabrication.
Approximate Time In Hours
3.00
Lecture
Outline
Advanced Dimensioning Methods and Conversions. Identify and interpret dimensioning techniques for common features such as chamfers, holes, tapers, fillets, and keyways. Explain standard dimensioning arrangements including chain, baseline, ordinate, and tabulated methods. Determine how dimensions apply relative to surface treatments. Calculate missing dimensions and convert between fractional, decimal, and metric units using appropriate formulas.
Approximate Time In Hours
3.00
Lecture
Outline
Introduction to Tolerances and Print Interpretation. Define tolerances and explain their importance in manufacturing. Identify implicit and explicit tolerances on technical drawings, including those provided through symbols or external references. Calculate minimum and maximum allowable values for specified dimensions using stated tolerances. Describe how tolerances are applied to features such as angular surfaces, tapers, and radii.
Approximate Time In Hours
3.00
Lecture
Outline
Tolerance Accumulation, Statistical Methods, and Geometric Considerations. Explain the concept of tolerance accumulation and calculate its impact based on different dimensioning arrangements. Recognize the limitations of size-only tolerancing and describe the need for geometric tolerances. Identify and interpret statistical tolerances and apply methods for calculating dimension limits when not explicitly stated on the drawing.
Approximate Time In Hours
3.00
Lecture
Outline

Introduction to Geometric Dimensioning and Tolerancing (GD&T) Fundamentals. Define geometric tolerances and explain their role in controlling part features beyond size. Identify standard GD&T symbols and interpret feature control frames. Describe the concept of basic dimensions and recognize their use on prints. Distinguish between Maximum Material Condition (MMC) and Least Material Condition (LMC), and calculate their values based on feature size.
Approximate Time In Hours
6.00
Lecture
Outline
Geometric Controls, Datum Systems, and Bonus Tolerance. Identify geometric characteristic symbols used for form, orientation, location, profile, and runout. Interpret datum feature identifiers and explain the structure and precedence of the datum reference frame. Recognize when bonus tolerance applies and calculate adjusted geometric tolerance values. Visualize parts as collections of toleranced features and surfaces defined by geometric constraints.
Approximate Time In Hours
6.00
Lecture
Outline
Thread Terminology and Thread Types. Define common terminology used for threaded features and describe the differences between various thread forms, including unified, metric, pipe, metric pipe, acme, and buttress. Identify how these thread types are represented on technical drawings and explain the significance of symbolic, realistic, and simplified thread depictions.
Approximate Time In Hours
3.00
Lecture
Outline
Thread Interpretation and Feature Identification. Interpret threaded feature indications on prints and identify thread details such as nominal major diameter, pitch, tolerance class, and thread hand. Distinguish between internal and external threads and evaluate how thread specifications communicate critical manufacturing and inspection information.
Approximate Time In Hours
3.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Lecture
Define the role and purpose of blueprints in manufacturing and identify who uses them and how.
Lecture
Describe the three key elements of a manufacturing print and explain how they relate to the manufacturing cycle.
Lecture
Interpret orthographic projections, isometric views, and auxiliary views, including first- and third-angle projection systems.
Lecture

Identify and explain the function of common drawing elements such as borders, title blocks, revision history blocks, notes, and assembly bills of materials.
Lecture
Recognize and interpret various view types including local, removed, rotated, detail, and sectional views, using conventional simplification techniques.
Lecture
Identify standard line types and dimensioning conventions in both English and metric formats, including linear, radial, diametral, and angular dimensions.
Lecture
Apply common dimensioning methods such as baseline, chain, ordinate, and tabulated to interpret part features accurately.
Lecture
Calculate and interpret tolerances, including implicit and explicit tolerances, tolerance accumulation, and statistical tolerancing.
Lecture
Define geometric tolerances, interpret feature control frames, and apply concepts such as Maximum Material Condition (MMC), bonus tolerance, and the datum reference frame.
Lecture
Identify and interpret geometric controls related to form, orientation, location, profile, and runout.
Lecture
Recognize various thread forms and interpret threaded features on drawings, including thread callouts, pitch, tolerance class, and thread hand.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1.

SLO 1 – Blueprint Interpretation and View Analysis

Outcome:
Upon successful completion of this course, students will be able to interpret orthographic, isometric, auxiliary, and sectional views on manufacturing blueprints to identify part geometry and spatial relationships.

- **Understand** (interpreting view types and visualizing parts)
- **Analyze** (differentiating and evaluating multiple views)

2.

SLO 2 – Dimensional and Tolerance Analysis

Outcome:
Upon successful completion of this course, students will be able to analyze and calculate dimensional values and allowable variation using standard and geometric tolerancing methods in both English and metric formats.

- **Apply** (calculating tolerances)
- **Analyze** (interpreting dimensioning schemes and tolerance accumulation)

- **Evaluate** (assessing compliance with drawing specifications)

3.
SLO 3 – Technical Data Extraction from Engineering Prints
Outcome:
Upon successful completion of this course, students will be able to extract and evaluate key manufacturing data from prints, including title block information, notes, thread specifications, and feature annotations. **Remember** (recalling terminology and symbols)

- **Evaluate** (extracting and interpreting relevant print data)
- **Apply** (using print information in real-world contexts)

Methods of Instruction
Demonstration
Demonstrate concepts related to course description and content; to fulfill Course Objectives and SLO's.
Discussion
Initiate class discussions on topics related to the course description and content; to fulfill Course Objectives and SLO's.
Lecture
Lecture on topics related to course description and content; to fulfill Course Objectives and SLO's.
Multimedia presentations
Using the overhead projector, utilize video and PowerPoint presentation content related to course description and content; to fulfill Course Objectives and SLO's.

Methods of Evaluation
Problem solving demonstrations (computational or non-computational)
Exams/Quizzes

Typical Assignments
Some assignments require critical thinking:
The Arm and Hub Assembly drawing provided incorporates GD&T per ANSI Y-14.5. at Minimum Material Condition (MMC) and calculate the tolerance zone for all of the drilled hole. Report findings on a one-page worksheet and submit to the instructor for evaluation.

Examine the engineering drawing for the Lower Support Cylinder Union and interpret the call-outs and feature control frames for each GD&T symbol. Report your findings on a one-page worksheet and submit to the insructor for evaluation.

Other Assignments:

Refer to the orthographic projection of the "Corner Gadget Block" provided by the instructor. Using cardboard and tape, contruct the " Corner Gadget Block" within an area no larger than 1 cubic foot. Submit gadget block to the instructor for evaluation.

Course Materials

Author: C.Gillis & W.Hammer
Title: Hammer's Blueprint Reading Basics
Edition: 5th edition
Publisher: Industrial Press
ISBN-13: 9780831136925
Year: 2024
Or Equivalent: No
Author: Walter C. Brown
Title: BLUEPRINT READING FOR INDUSTRY
Edition: 10th
Publisher: Goodheart Wilcox
Year: 2016
Or Equivalent: No

Minimum Qualification

1. Machine Tool Technology
Condition

Two Year CTE Course Review – No Proposed Changes –
MTT 101 – Introduction to Conventional and CNC Machining

Course Information

Course Discipline: MTT
Course Division: Business and Industrial Studies
Course Number: 101
Full Course Title: Introduction to Conventional and CNC Machining
Short Title: Intro to Conv & CNC Machining
TOP Code: 095630 - Machining and Machine Tools
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status B - Transferable to CSU only.
Effective Term: Summer 2021
Board of Trustees Approval Date:
2020-11-17

Course Description

In this course, students will be introduced to the principles and operation of conventional and Computer Numerically Controlled (CNC) machine tools with an emphasis on safety, measurement, hand tools, power saws, drilling machines, lathes, and milling and grinding machines focusing on practices and setups used in industry. Note: Letter grade or pass/no pass option.

Course Standards

Lecture Hours:
54.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
54.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
3.000
Activity Units:
0.000
Lab Units:
1.000
Min/Max Units:
4.000
Total Hours:
108.000
Grading Method:
Both - Letter with Pass/No Pass Option

Course Content

Lecture
Outline
Orientation Machine tool technology analysis Safe shop practices in metalworking Hand tools and bench work Safety test
Approximate Time In Hours
4.00
Lab
Outline

Orientation Machine tool technology analysis Safe shop practices in metalworking Hand tools and bench work Safety test
Approximate Time In Hours
2.00
Lecture
Outline
Machine Tool Calculations Speeds and feeds Lathe toolbit geometry
Approximate Time In Hours
4.00
Lab
Outline
Machine Tool Calculations Speeds and feeds Lathe toolbit geometry
Approximate Time In Hours
2.00
Lecture
Outline
Measurement and Measuring Tools Rulers and scales Micrometers Verniers calipers Other hand measurement tools
Approximate Time In Hours
6.00
Lab
Outline
Measurement and Measuring Tools Rulers and scales Micrometers Verniers calipers Other hand measurement tools
Approximate Time In Hours
4.00
Lecture
Outline
Layout Tools Layout tables Height gage Marking fluids Layout hand tools
Approximate Time In Hours
2.00
Lab
Outline
Layout Tools Layout tables Height gage Marking fluids Layout hand tools
Approximate Time In Hours
2.00
Lecture
Outline
Materials of Manufacture Ferrous Non-ferrous Carbon steels Cast irons Alloys
Approximate Time In Hours
3.00
Lab
Outline
Materials of Manufacture Ferrous Non-ferrous Carbon steels Cast irons Alloys
Approximate Time In Hours
2.00

Lecture
Outline
Power Saws Power hack saws Vertical band saws Horizontal band saws Band saw blade selection Band saw operations
Approximate Time In Hours
3.00
Lab
Outline
Power Saws Power Saws Power hack saws Vertical band saws Horizontal band saws Band saw blade selection Band saw operations
Approximate Time In Hours
2.00
Lecture
Outline
Reading Engineering Drawings Views Orthographic projection Isometric projection Alphabet of lines Detail drawing versus assembly drawing Drawing page layout
Approximate Time In Hours
4.00
Lab
Outline
Reading Engineering Drawings Views Orthographic projection Isometric projection Alphabet of lines Detail drawing versus assembly drawing Drawing page layout
Approximate Time In Hours
2.00
Lecture
Outline
Engine Lathes Engine lathe parts Lathe accessories Cutting speeds, feeds, and depth of cut Lathe operations
Approximate Time In Hours
6.00
Lab
Outline
Engine Lathes Engine lathe parts Lathe accessories Cutting speeds, feeds, and depth of cut Lathe operations
Approximate Time In Hours
12.00
Lecture
Outline
Threads Thread terminology Thread forms Thread fits and classifications Thread calculations Thread cutting Thread measurement
Approximate Time In Hours
6.00
Lab
Outline
Threads Thread terminology Thread forms Thread fits and classifications Thread calculations Thread cutting Thread measurement

Approximate Time In Hours
6.00
Lecture
Outline
Drilling Operations Drill presses Drilling machine accessories Twist drills Cutting speeds and feeds Drilling holes Drill press operations
Approximate Time In Hours
2.00
Lab
Outline
Drilling Operations Drill presses Drilling machine accessories Twist drills Cutting speeds and feeds Drilling holes Drill press operations
Approximate Time In Hours
6.00
Lecture
Outline
Conventional Milling Machines Milling machines and accessories Milling cutters Cutting speeds, feeds and depth of cut Milling machine setups Milling operations
Approximate Time In Hours
4.00
Lab
Outline
Conventional Milling Machines Milling machines and accessories Milling cutters Cutting speeds, feeds and depth of cut Milling machine setups Milling operations
Approximate Time In Hours
8.00
Lecture
Outline
CNC Milling Machines, Introduction and Demonstration Type of CNC milling machines Cartesian coordinate system Point-to-point positioning Continuous-path control Absolute programming CNC setup and operation
Approximate Time In Hours
8.00
Lab
Outline
CNC Milling Machines, Introduction and Demonstration Type of CNC milling machines Cartesian coordinate system Point-to-point positioning Continuous-path control Absolute programming CNC setup and operation
Approximate Time In Hours
4.00
Lecture
Outline
Grinding Machines Types of grinding machines Surface grinding Accessories Surface-grinding operations
Approximate Time In Hours
2.00
Lab

Outline
Grinding Machines Types of grinding machines Surface grinding Accessories Surface-grinding operations
Approximate Time In Hours
2.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Lecture
Correctly apply machine shop safety practices with 100% accuracy.
Lab
Select and use metal working hand tools to produce assigned work within the tolerances specified on engineering drawings.
Lab
Measure and layout utilizing semi-precision and precision measuring tools to produce assigned work within the tolerances specified on engineering drawings.
Lab
Set up and operate power saws to rough finish assigned work within a minimum of 1/32 of an inch over the dimensions required on engineering drawings.
Lab
Center drill, drill, ream, countersink, counterbore and tap threads to produce assigned work within the tolerances specified on engineering drawings.
Lab
Set up and operate engine lathes to turn, face, center drill, thread, and cut off to produce assigned work within the tolerances specified on engineering drawings.
Lab
Set up and operate vertical and horizontal milling machines to square stock, mill flat surfaces, side mill, end mill, fly cut and slot to produce assigned work within the tolerances specified on engineering drawings.
Lab
Set up and operate grinding machines to sharpen lathe tool bits, and surface grind to produce assigned work within the tolerances specified on the engineering drawings.
Lab
Interpret orthographic projection engineering drawings that incorporate geometric dimensioning and tolerancing to produce assigned work within the tolerances specified on engineering drawings.
Lecture
Solve shop math problems that involve speeds and feeds, threads, engineering drawing interpretation and calculations relating to machine tools.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1. **SLO #1 Measuring and Recording Dimensions**. Given a ground steel block of known and verified dimensions, measure and record the three dimensions of the block using a micrometer to a precision of .001 inches.

2. **SLO #2 Blue Prints -** Given a Blue Print, student will use all manufacturing equipment available to manufacture the project on the Blue Print to noted specifications.

3. **SLO #3 Orthographic Projections -** The student will be able to solve shop math problems and interpret orthographic projection engineering drawings that incorporate geometric dimensioning and tolerancing to produce assigned work within the tolerances specified on engineering drawings.

Methods of Instruction

Demonstration
Demonstrate lecture and lab content related to course description and content; to fulfill Course Objectives and SLO's.
Laboratory
Involve students with different project based lab assignments related to course description and content; to fulfill Course Objectives and SLO's.
Lecture
Lecture on topics related to course description and content; to fulfill Course Objectives and SLO's.
Multimedia presentations
Using the overhead projector, utilize video and PowerPoint presentation content related to course description and content; to fulfill Course Objectives and SLO's.
Simulation
Demonstrate and involve students with various machine operations using simulation software that emulates industry relevant machinery.

Methods of Evaluation

Problem solving demonstrations (computational or non-computational)
Exams/Quizzes

Typical Assignments

Some assignments require critical thinking:
Analyze the engineering specifications for part number MS-13, "C-Clamp," and determine the needed cutting tools and accessories to machine the frame. Set up a conventional vertical milling machine and perform the machining operations required to complete the part. Measure the completed part and record any part features not within the tolerance specified on a one page inspection report.

According to the engineering specifications for the "C-Clamp Swivel Pad," a bevel must be machined on the lathe. Given the diameters and length of the part, calculate the angle for setting the compound rest. Make the necessary adjustment on the machine and take a trial cut to confirm your calculations. Finish by machining the bevel within the tolerance specified. Submit part for evaluation.

Other Assignments:
A drilling machine is to be set-up for drilling a .75 diameter hole in a piece of 2024-T4 aluminum:

1. What is the Cutting Speed (CS) and Feed Per Tooth (FPT) for 2024-T4 aluminum?
2. What are the formulas for calculating Revolutions per Minute (RPM) and feed?
3. Calculate the RPM and feed for the above problem, record on a one page report and submit for evaluation.

Course Materials

Author: Rick Calverley
Title: CNC Manufacturing Technology
Edition: 1st
Publisher: G-W
ISBN-13: 978-1-63563-883-7
Year: 2021
Or Equivalent: No
Author: LamNgeun Virasak
Title: Manufacturing Processes 4-5
Publisher: Open Oregon Educational Resources
ISBN-13: 978-1-63635-048-6
Year: 2023
Or Equivalent: No
Author: Krar, Stephen F., Arthur R. Gill and Peter Smid
Title: Technology of Machine Tools
Edition: 7
Publisher: McGraw Hill
Year: 2011
Or Equivalent: No
Other:
Safety glasses or goggles 2. Steel rule - flexible - 6" 3. Clean shop coat/apron 4. Lathe tool bits - 3/8" square 5. Materials for projects 6. Scientific calculator 7. Pocket trigonometric tables

Minimum Qualification

1. Machine Tool Technology
Condition

Two Year CTE Course Review – No Proposed Changes –
MTT 103 – Conventional and CNC Turning

Course Information

Course Discipline: MTT
Course Division: Business and Industrial Studies
Course Number: 103
Full Course Title: Conventional and CNC Turning
Short Title: Conv. & CNC Turning
TOP Code: 095630 - Machining and Machine Tools
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status B - Transferable to CSU only.
Effective Term: Fall 2022
Board of Trustees Approval Date:
2022-03-21

Course Description

In this course, students will study at an advanced level the principles and operation of conventional and Computer Numerically Controlled (CNC) machine tools with an emphasis on the set up and operation of lathes. Topics will include safety, turning, drilling, boring, threading, cutting tools, CNC programming practices, and setups as applied in industry.

Course Standards

Lecture Hours:
54.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
54.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
3.000
Activity Units:
0.000
Lab Units:
1.000
Min/Max Units:
4.000
Total Hours:
108.000
Grading Method:
Both - Letter with Pass/No Pass Option

Course Requirements

Co-requisite
Subject MTT - Machine Tool Technology
Requisite Course MTT 101 - Introduction to Conventional and CNC Machining (Active)4.000 - 4.000
Other
Non Course Requirements
equivalent

Course Content

Lecture
Outline
Orientation and Safety Review A. Machine tool technology analysis B. Safe shop practices in metalworking C. Hand tool and bench work D. Safety test
Approximate Time In Hours
4.00
Lab
Outline
Orientation and Safety Review A. Machine tool technology analysis B. Safe shop practices in metalworking C. Hand tool and bench work D. Safety test
Approximate Time In Hours
3.00
Lecture
Outline
Review - Basic Machining and Supplemental Processes A. Measurement B. Basic lathe C. Basic milling machines D. Basic grinding E. Print reading F. Procedures
Approximate Time In Hours
4.00
Lab
Outline
Review - Basic Machining and Supplemental Processes A. Measurement B. Basic lathe C. Basic milling machines D. Basic grinding E. Print reading F. Procedures
Approximate Time In Hours
3.00
Lecture
Outline
External Lathe Operations A. Facing B. Paralllel turning C. Shoulder turning D. Knurling E. Grooving F. Cutting off G. Filing and polishing H. Grinding I. Taper turning J. Threading K. Form turning
Approximate Time In Hours
5.00
Lab
Outline
External Lathe OperationsA. FacingB. Parallel turningC. Shoulder turningD. KnurlingE. GroovingF. Cutting offG. Filing and polishingH. GrindingI. Taper turningJ. Threading
Approximate Time In Hours
6.00
Lecture
Outline
Internal Lathe OperationsA. Center drillingB. DrillingC. ReamingD. BoringE. Internal threadingF. Internal taper turningG.TappingH. Honing
Approximate Time In Hours
5.00
Lab
Outline

Internal Lathe OperationsA. Center drillingB. DrillingC. ReamingD. BoringE. Internal threadingF. Internal taper turningG.TappingH. Honing
Approximate Time In Hours
6.00
Lecture
Outline
Work-holding Devices and Tooling A. Three-jaw universal chuck B. Four-jaw independent chuck C. Collet chuck D. Quick release collet E. Magnetic chuck F. Faceplates and lathe dogs G. Jigs, fixtures and angle plates H. Steadyrest, follower rest, and mandrelI. I Cutting tool holding devices J. Quick-change tooling
Approximate Time In Hours
4.00
Lab
Outline
Work-holding Devices and ToolingA. Three-jaw universal chuckB. Four-jaw independent chuckC. Collet chuckD. Quick release colletE. Magnetic chuckF. Faceplates and lathe dogsG. Jigs, fixtures and angle platesH. Steadyrest, follower rest, and mandrelI. Cutting tool holding devicesJ. Quick-change tooling
Approximate Time In Hours
6.00
Lecture
Outline
Threading OperationsA. Thread terminologyB. Thread formsC. Thread fits and classificationsD. Thread calculationsE. Thread-cutting operationF. Thread measurementG. Internal threadingH. Tapping
Approximate Time In Hours
4.00
Lab
Outline
Threading OperationsA. Thread terminologyB. Thread formsC. Thread fits and classificationsD. Thread calculationsE. Thread-cutting operationF. Thread measurementG. Internal threadingH. Tapping
Approximate Time In Hours
3.00
Lecture
Outline
CNC Programming, Commands, Formats, Input, Proofing, EditingA. Word address programmingB. Intuitive Programming System (IPS)C. Cartesian coordinatesD. Machine tool axesE. Lathe format and wordsF. MDIG. Computer downloadH. Methods of program proofingI. Methods of editing
Approximate Time In Hours
4.00
Lab
Outline
CNC Programming, Commands, Formats, Input, Proofing, EditingA. Word address programmingB. IPSC. Cartesian coordinatesD. Machine tool axesE. Lathe format and wordsF. MDIG. Computer downloadH. Methods of program proofingI. Methods of editing
Approximate Time In Hours
3.00
Lecture

Outline
Applied TrigonometryA. Trigonometry formulasB. Trigonometry calculationsC. Angle cuttingD. Taper turningE. Thread calculationsF. Toolbit grindingG. Angle measurement
Approximate Time In Hours
5.00
Lab
Outline
Applied TrigonometryA. Trigonometry formulasB. Trigonometry calculationsC. Angle cuttingD. Taper turningE. Thread calculationsF. Toolbit grindingG. Angle measurement
Approximate Time In Hours
6.00
Lecture
Outline
Tapers, Taper Calculations and InspectionA. Standard tapersB. Self-holding tapers and self-releasing tapersC. Taper calculationsD. Taper attachmentE. Tailstock offsetF. Form turningG. Compound restH. Taper inspection
Approximate Time In Hours
4.00
Lab
Outline
Tapers, Taper Calculations and InspectionA. Standard tapersB. Self-holding tapers and self-releasing tapersC. Taper calculationsD. Taper attachmentE. Tailstock offsetF. Form turningG. Compound restH. Taper inspection
Approximate Time In Hours
3.00
Lecture
Outline
Machine Control Units (MCU), MDIA. Control panelB. Manual operationC. Offset menusD. Program libraryE. DisplaysF. Feed holdG. Emergency stop
Approximate Time In Hours
4.00
Lab
Outline
MCU, MDIA. Control panelB. Manual operationC. Offset menusD. Program libraryE. DisplaysF. Feed holdG. Emergency stop
Approximate Time In Hours
3.00
Lecture
Outline
Tool Offsets and Tool Holding DevicesA. Tool change codeB. Tool offset codeC. Tool offset measurementD. Tool offset storageE. Tool holdersF. Carbide tool holdersG. Quick change tool holders
Approximate Time In Hours
4.00
Lab
Outline

Tool Offsets and Tool Holding DevicesA. Tool change codeB. Tool offset codeC. Tool offset measurementD. Tool offset storageE. Tool holdersF. Carbide tool holdersG. Quick change tool holders
Approximate Time In Hours
3.00
Lecture
Outline
Set up and CNC Lathe OperationA. CNC performanceB. Advantages and disadvantages of CNCC. Power upD. Setting part zeroE. Setting tool length offsetF. Downloading programG. Automatic operation
Approximate Time In Hours
7.00
Lab
Outline
Set up and CNC Lathe OperationA. CNC performanceB. Advantages and disadvantages of CNCC. Power upD. Setting part zeroE. Setting tool length offsetF. Downloading programG. Automatic operation
Approximate Time In Hours
9.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Lab
Correctly use hand tools, layout tools, measuring tools, power saws, drilling machines, milling machines, and grinding machines.
Lab
Set up and operate engine lathes to perform the operations of straight and taper turning, form turning, facing, center drilling, drilling, reaming, boring, knurling, threading and cutoff processes to produce assigned work within the tolerances specified on engineering drawings.
Lab
Correctly apply machine shop safety practices with 100% accuracy.
Lab
Set up and operate a CNC lathe to perform straight and taper turning, radius turning, facing, center drilling, drilling, reaming, boring, and cutoff processes to produce assigned work within tolerances specified on engineering drawings.
Lecture
Read, de-bug and edit CNC lathe word address programs to produce assigned work within the tolerances specified on engineering drawings.
Lecture
Enter Manual Data Input (MDI) CNC word address lathe programs to produce work within the tolerances on engineering drawings.
Lecture
Solve shop math problems that include speeds and feeds, trigonometry, tapers, threads, engineering drawing interpretation and calculations relating to machine tools.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1. SLO #1 Lathe work - Given engineering drawings for a part, students will be able to machine the part on a lathe or lathe emulator that meets the required specifications called out in the drawings.

2. SLO #2 CNC Lathe Programs - Read, debug and edit CNC lathe word address programs and enter Manual Data Input (MDI) CNC word address lathe programs to produce work within the tolerances on engineering drawings.

3. SLO#3 - Solve shop math problems relating to lathe operation that include speeds and feeds, trigonometry, tapers, threads, engineering drawing interpretation and calculations.

Methods of Instruction

Demonstration
Demonstrate lecture and lab content related to course description and content; to fulfill Course Objectives and SLO's.
Laboratory
Involve students with different hands-on lab assignments related to course description and content; to fulfill Course Objectives and SLO's.
Lecture
Lecture on topics related to course description and content; to fulfill Course Objectives and SLO's.
Multimedia presentations
Using the overhead projector, utilize video and PowerPoint presentation content related to course description and content; to fulfill Course Objectives and SLO's.
Simulation
Demonstrate and involve students with various machine operations using simulation software that emulates industry relevant machinery.

Methods of Evaluation

Problem solving demonstrations (computational or non-computational)
Skills demonstrations
Exams/Quizzes

Typical Assignments

Some assignments require critical thinking:
Analyze the manufacturing procedures for the "Bell Housing," and determine the replaceable insert cutting tools needed to machine the interior features on a CNC Turning Center. Install the tools in the turret, calculate the tool offsets and input the offsets via the machine control unit. Perform a trial run of the CNC program prior to machining the first part.

Perform a complete inspection of all dimensioned features of the machined "Bell Housing," comparing the measured dimensions with the engineering specifications. Complete a one page inspection report and submit for evaluation.

Other Assignments:
A CNC Turning Center is to be set up for boring a 50mm diameter hole in a part made from A-4130 alloy steel, with a High Speed Steed (HSS) boring tool:

1. What is the Cutting Speed (CS) and recommended feedrate for this application?
2. What is the formula for calculating Revolutions Per Minute (RPM)?
3. Calculate the RPM for the above problem, record in a one page report and submit for evaluation.

Course Materials

Author: Rick Calverley
Title: CNC Manufacturing Technology
Edition: 1st
Publisher: G-W
ISBN-13: 978-1-63563-883-7
Year: 2021
Or Equivalent: No
Author: LamNgeun Virasak
Title: Manufacturing Processes 4-5
Publisher: Open Oregon Educational Resources
ISBN-13: 978-1-63635-048-6
Year: 2023
Or Equivalent: No
Other:
Scientific calculator (trigonometry functions) 2. Safety glasses or goggles 3. Flexible 6 inch steel rule 4. Clean shop coat or apron 5. Lathe tool bits (3/8" square) 6. Materials for projects

Minimum Qualification

1. Machine Tool Technology
Condition

Two Year CTE Course Review – No Proposed Changes –
MTT 105 – Conventional and CNC Milling

Course Information

Course Discipline: MTT
Course Division: Business and Industrial Studies
Course Number: 105
Full Course Title: Conventional and CNC Milling
Short Title: Conv. & CNC Milling
TOP Code: 095630 - Machining and Machine Tools
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status B - Transferable to CSU only.
Effective Term: Spring 2021
Board of Trustees Approval Date:
2021-03-16

Course Description

In this course, students will study at an advanced level the principles and operation of conventional and Computer Numerically Controlled (CNC) machine tools with an emphasis on the setup and operation of milling machines. Topics will include safety, drilling, milling, tapping, tooling, CNC programming practices, and setups as applied in industry.

Course Standards

Lecture Hours:
54.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
54.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
3.000
Activity Units:
0.000
Lab Units:
1.000
Min/Max Units:
4.000
Total Hours:
108.000
Grading Method:
Both - Letter with Pass/No Pass Option

Course Requirements

Prerequisite
Subject MTT - Machine Tool Technology
Requisite Course MTT 101 - Introduction to Conventional and CNC Machining (Active)4.000 - 4.000
Prerequisite
Subject MTT - Machine Tool Technology
Requisite Course MTT 146 - Basic Machine Tool Operation (Active)3.000 - 3.000
Other
Non Course Requirements
equivalent

Course Content

Lecture
Outline
Safety Review A. Machine tool technology analysis B. Safe shop practices in metalworking C. Hand tool and bench work D. Safety test
Approximate Time In Hours
4.00
Lab
Outline
Safety Review A. Machine tool technology analysis B. Safe shop practices in metal working C. Hand tool and bench work D. Safety test
Approximate Time In Hours
2.00
Lecture
Outline
Review - Basic Machining and Supplemental Processes A. Measurement B. Basic lathe C. Basic milling machines D. Basic grinding E. Print reading F. Procedures
Approximate Time In Hours
6.00
Lab
Outline
Review - Basic Machining and Supplemental Processes A. Measurement B. Basic lathe C. Basic milling machines D. Basic grinding E. Print reading F. Procedures
Approximate Time In Hours
6.00
Lecture
Outline
Conventional Milling Machine Orientation, Setup and Operation A. Horizontal milling machine operations B. Milling cutters
Approximate Time In Hours
8.00
Lab
Outline
Conventional Milling Machine Orientation, Setup and Operation A. Vertical milling machine operations B. Milling cutters
Approximate Time In Hours
6.00
Lecture
Outline
Applied Trigonometry A. Rotary table calculations B. Index and dividing head calculations C. Dovetail calculations D. Compound angle calculations E. Setups 1. Rotary tables 2. Index and dividing heads 3. Dovetail cutting 4. Compound angle cutting
Approximate Time In Hours
4.00

Lab
Outline
Applied Trigonometry A. Rotary table calculations B. Index and dividing head calculations C. Dovetail calculations D. Compound angle calculations E. Setups 1. Rotary tables 2. Index and dividing heads 3. Dovetail cutting 4. Compound angle cutting
Approximate Time In Hours
4.00
Lecture
Outline
CNC Milling Machine Orientation, Setup and Operation A. CNC performance B. Advantages and disadvantages of CNC C Cartesian coordinates D. Machine tool axes E. Absolute system F. Storage and input media G. Programming format H. Program planning I. Machine start-up J. Fixture offset K. Tool offset L. Automatic operations M. Shut down N. Emergency stop
Approximate Time In Hours
8.00
Lab
Outline
CNC Milling Machine Orientation, Setup and Operation A. CNC performance B. Advantages and disadvantages of CNC C Cartesian coordinates D. Machine tool axes E. Absolute system F. Storage and input media G. Programming format H. Program planning I. Machine start-up J. Fixture offset K. Tool offset L. Automatic operations M. Shut down N. Emergency stop
Approximate Time In Hours
6.00
Lecture
Outline
Programming Commands and Codes A. Methods of program proofing B. Online editing C. Offline editing D. Screen plotting E. Dry run
Approximate Time In Hours
6.00
Lab
Outline
Programming Commands and Codes A. Programming format B. Program name code C. Axis code D. G-codes E. M-codes F. S-word G. F-word
Approximate Time In Hours
6.00
Lecture
Outline
Program Proofing, Editing, Program Simulation A. Methods of program proofing B. Online editing C. Offline editing D. Screen plotting E. Dry run
Approximate Time In Hours
4.00
Lab
Outline
Program Proofing, Editing, Program Simulation A. Methods of program proofing B. Online editing C. Offline editing D. Screen plotting E. Dry run
Approximate Time In Hours

6.00
Lecture
Outline
Tool Selection and Workpiece Holding A. Cutting tools B. Collet holders C. CAT 40 holders D. Vises E. Fixtures F. Tooling plates G. Clamping systems
Approximate Time In Hours
4.00
Lab
Outline
Tool Selection and Workpiece Holding A. Cutting tools B. Collet holders C. CAT 40 holders D. Vises E. Fixtures F. Tooling plates G. Clamping systems
Approximate Time In Hours
6.00
Lecture
Outline
Tool Length Offsets and Pre-set Tooling A. Setting tool lengths B. Tool setters C. Offset page D. H-word E. Setting pre-set tools F. Offsetting pre-set tools
Approximate Time In Hours
6.00
Lab
Outline
Tool Length Offsets and Pre-set Tooling A. Setting tool lengths B. Tool setters C. Offset page D. H-word E. Setting pre-set tools F. Offsetting pre-set tools
Approximate Time In Hours
8.00
Lecture
Outline
Machine Control Units and Manual Data Input (MDI) A. Haas B. Fadal C. Fanuc D. Keyboard entries E. Saving MDI program
Approximate Time In Hours
2.00
Lab
Outline
Machine Control Units and MDI A. Haas B. Fadal C. Fanuc D. Keyboard entries E. Saving MDI program
Approximate Time In Hours
2.00
Lecture
Outline
Data Transfer and Storage A. Floppy disc B. USB thumb drive C. Electronic download D. Compact flash card
Approximate Time In Hours
2.00
Lab
Outline
Data Transfer and Storage A. Floppy disc B. USB thumb drive C. Electronic download D. Compact flash card

Approximate Time In Hours
2.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Lecture
Correctly apply machine shop safety practices with 100% accuracy.
Lab
Correctly use hand tools, measuring tools, power saws, engine lathes, drilling machines and grinding machines to perform supplemental machine tool operations on assigned work within the tolerances specified on engineering drawings.
Lab
Set up and operate vertical and horizontal milling machines to square stock, mill flat surfaces, face mill, side mill, end mill, fly cut, slit, and slot to produce assigned work within the tolerances specified on engineering drawings.
Lecture
Set up and operate rotary tables, indexing and dividing heads to produce assigned work within the tolerances specified on engineering drawings.
Lab
Set up and operate CNC vertical milling machines to produce assigned work within the tolerances specified on engineering drawings.
Lecture
Solve shop mathematics problems involving trigonometry and its application to rotary tables, indexing and dividing heads, dovetails, compound angles, speeds and feeds, blueprint interpretation and calculations relating to the milling machine.
Lecture
Read, de-bug and edit CNC vertical milling machine word address programs to produce assigned work within the tolerances specified on engineering drawings.
Lab
Enter Manual Data Input (MDI) CNC word address milling machine programs to machine vise soft jaws for holding work to produce parts within the tolerances specified on engineering drawings.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1. SLO # 1 Part inspection - Utilize provided engineering drawings and metrology equipment to inspect a given part to determine if the part was manufactured within allowable tolerances. Answers will be recorded to an inspection sheet.

2. SLO #2 Part production - Students will be able to set up and operate milling machines to produce assigned work within the tolerances specified on engineering drawings.

3. SLO # 3 Manual Data Input - Students will be able to read, de-bug and edit CNC vertical milling machine word address programs and to enter Manual Data Input (MDI) CNC word address milling

machine programs to produce parts within the tolerances specified on engineering drawings.

Methods of Instruction

Demonstration
Demonstrate lecture and lab content related to course description and content; to fulfill Course Objectives and SLO's.
Discussion
Create discussions between students that provoke an analysis of conventional and CNC milling.
Internet Presentation/Resources
Utilize various internet based resources that are relevant to the course being taught.
Laboratory
Involve students with different hands-on lab assignments related to course description and content; to fulfill Course Objectives and SLO's.
Lecture
Lecture on topics related to course description and content; to fulfill Course Objectives and SLO's.
Multimedia presentations
Using the overhead projector, utilize video and PowerPoint presentation content related to course description and content; to fulfill Course Objectives and SLO's.
Simulation
Demonstrate and involve students with various machine operations using simulation software that emulates industry relevant machinery.

Methods of Evaluation

Problem solving demonstrations (computational or non-computational)
Skills demonstrations
Exams/Quizzes

Typical Assignments

Some assignments require critical thinking:
Calculate the angle to tilt the head on a conventional vertical mill to machine the feature shown at zone C-4 on the engineering drawing for part number MS-22. Based on the calculated angle, specify whether you would recommend cutting the feature with the side or end of the selected cutting tool on a one-page lab report. Submit lab report to the instructor.

It has been determined that the rate of feed for a machining sequence in the middle of a program running on the CNC Machining Center is excessive. Determine number of the sequence, calculate the appropriate feed rate, edit the sequence at the machine control unit and run the part to confirm that the change has corrected the problem. Report the results of your corrective actions on a one-page lab report. Submit lab report to the instructor.

Other Assignments:

Using the "Kennametal" Insert Catalog, look up the part number for the replaceable insert needed for the tool holder provided to you. Applying industry standard specifications, prepare a purchase order for five inserts that would produce a maximum corner radius of .06". Submit the purchase order to the instructor.

Course Materials

Author: LamNgeun Virasak
Title: Manufacturing Processes 4-5
Publisher: Open Oregon Educational Resources
ISBN-13: 978-1-63635-048-6
Year: 2023
Or Equivalent: No
Author: Stephen F. Krar, Arthur R. Gill and Peter Smid
Title: Technology of Machine Tools
Edition: 7th
Publisher: McGraw Hill
Year: 2011
Rationale for older textbook:
INDUSTRY STANDARD
Or Equivalent: No
Other:
Safety glasses or goggles 2. Steel rule - flexible - 6" 3. Clean shop coat/apron 4. Lathe tool bits - 3/8" square 5. Materials for projects 6. Scientific calculator

Minimum Qualification

1. Machine Tool Technology
Condition

Two Year CTE Course Review – No Proposed Changes – MTT 110 – Introduction to CAD/CAM

Course Information

Course Discipline: MTT
Course Division: Business and Industrial Studies
Course Number: 110
Full Course Title: Introduction to CAD/CAM
Short Title: Intro to Cad/Cam
TOP Code: 095630 - Machining and Machine Tools
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status B - Transferable to CSU only.
Effective Term: Fall 2021
Board of Trustees Approval Date:
2021-03-16

Course Description

This course covers the study of the fundamental concepts of Computer Aided Manufacturing (CAM). Concepts explored will include the application of computers in manufacturing, Computer Aided Design (CAD), Computer Numerical Control (CNC) programming, Automated Manufacturing and Integrated CAD/CAM.

Course Standards

Lecture Hours:
36.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
36.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
2.000
Activity Units:
0.000
Lab Units:
1.000
Min/Max Units:
3.000
Total Hours:
90.000
Grading Method:
Letter grade only

Course Content

Lecture
Outline
PRINCIPLES OF CAD/CAM Computer terminology Acronyms Career opportunities COMPUTER AIDED DESIGN AND DRAFTING Introduction Interactive computer graphics Applications Economics Two dimensional drafting Hardware requirements System capabilities Comparison of systems Three dimensional computer aided design
Approximate Time In Hours
8.00
Lab
Outline

Tool panel introduction, Cloud account setup, mouse movement, view cube, data management
Approximate Time In Hours
6.00
Lecture
Outline
Parametric Modeling Fundamentals, Sketch plane, Creating rough sketches, Geometric Constraint Symbols, Apply and modify constraints, Completing the Base Solid Feature
Approximate Time In Hours
5.00
Lab
Outline
Parametric Modeling Fundamentals, Sketch plane, Creating rough sketches, Geometric Constraint Symbols, Apply and modify constraints, Completing the Base Solid Feature
Approximate Time In Hours
6.00
Lab
Outline
Constructive solid geometry concepts. Binary tree, Modeling strategy, Dimention formats, base features, using measuring tool, Save the model.
Approximate Time In Hours
8.00
Lecture
Outline
Constructive solid geometry concepts. Binary tree, Modeling strategy, Dimention formats, base features, using measuring tool, Save the model.
Approximate Time In Hours
6.00
Lecture
Outline
Parametric modeling basics. Adding extrude feature, adding cut feature, adding multiple cuts.
Approximate Time In Hours
4.00
Lab
Outline
Parametric modeling basics. Adding extrude feature, adding cut feature, adding multiple cuts.
Approximate Time In Hours
6.00
Lecture
Outline
Model history tree, creating a 2d sketch, history based modifications, renaming parts, adding a placed feature, edit 2d sketches, direct part modification and associated physical properties.
Approximate Time In Hours
4.00
Lab
Outline

Model history tree, creating a 2d sketch, history based modifications, renaming parts, adding a placed feature, edit 2d sketches, direct part modification and associated physical properties.
Approximate Time In Hours
6.00
Lecture
Outline
Parametric constraint fundamentals, Geometric construction tools and parent child relationships and the BORN technique.
Approximate Time In Hours
4.00
Lab
Outline
Parametric constraint fundamentals, Geometric construction tools and parent child relationships and the BORN technique.
Approximate Time In Hours
8.00
Lecture
Outline
CAM software. Creating tool path operations. Facing, adaptive material clearing toolpaths, chamfers, drilling operations. Outputting toolpaths to g-code for machine use.
Approximate Time In Hours
4.00
Lab
Outline
CAM software. Creating tool path operations. Facing, adaptive material clearing toolpaths, chamfers, drilling operations. Outputting toolpaths to g-code for machine use.
Approximate Time In Hours
8.00
Lecture
Outline
Outputting model to 3d printers and design considerations.
Approximate Time In Hours
1.00

Lab
Outline
Outputting model to 3d printers and design considerations.
Approximate Time In Hours
6.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Lecture
Identify and define the use of computer system hardware components.
Lab

Using engineering drawings as reference, model a 3 dimensional representation of it utilizing a CAD (computer aided design) program.
Lab
Using CAM software, the student will be able to create the required toolpaths to machine the part with dimentinoal accuracy within given tolerances.
Lab
Output a CAD model to a format that can then be used for a rapid prototype machine.
Lecture
Create toolpaths for two axis CNC machines using computer numerical control graphics systems.
Lecture
Create complex 3 dimensional tool paths utilizing a computer aided manufacturing program.
Lecture
Output g-code from the CAM software that can be used as toolpath instructions for a computer numerically controlled machine.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1. **SLO #1 Computer Aided Design** - Student will be given a blueprint and will then use CAD software to create a dimentionally accurate 3d model of the given blueprint.

2. **SLO #2 Computer Aided Maanufacturing** - The student will start with a 3d model. Then using CAM software, the student will be able to create the required toolpaths to machine the part with dimentinoal accuracy within given tollerances.

3. **SLO #3** Create G-Code - Convert created toolpath operations into G-Code that gives directions to a CNC (computer numerically controlled) machine.

Methods of Instruction

Demonstration
Demonstrate content related to course description to fulfill Course Objectives and SLO's.
Discussion
Create discussions between students that provoke an analysis of CAD and CAM related topics.
Internet Presentation/Resources
Utilize various internet based resources that are relevant to the course being taught.
Laboratory
Lecture
Lecture on topics related to course description and content; to fulfill Course Objectives and SLO's.
Multimedia presentations
Using the overhead projector to project computer screen, utilize video and PowerPoint presentation content that is related to course description and content.
Simulation
Machine simulation is commonly used to validate program before running it.

Methods of Evaluation

Problem solving demonstrations (computational or non-computational)
Skills demonstrations
Exams/Quizzes

Typical Assignments

Some assignments require critical thinking:
Calculate the X and Y coordinate locations for the holes to be drilled in the part represented on the drawing supplied. Write calculations on a lab report and submit to the instructor.

Determine the sequence of operations to machine the part supplied and enter the sequence and tooling required on a job planning sheet. Submit planning sheet to the insructor.

Other Assignments:
Prepare a three-page G code written machine languagte program for the part shown in the engineering drawing provided. Submit written program to the instructor.

Course Materials

Author: Randy H. Shih
Title: Parametric Modeling with Autodesk Fusion 360
Edition: Spring 2025 Edition
Publisher: SDC Publications
ISBN-13: 978-1-63057-729-2
Year: 2025
Or Equivalent: No
Author: James Valentino
Title: INTRODUCTION TO COMPUTER NUMERICAL CONTROL
Publisher: Prentice Hall
Year: 2013
Rationale for older textbook:
INDUSTRY STANDARD
Or Equivalent: No
Other:
Removable memory media

Minimum Qualification

1. Machine Tool Technology
Condition

Two Year CTE Course Review – No Proposed Changes – MTT 160 – General Metals

Course Information

Course Discipline: MTT
Course Division: Business and Industrial Studies
Course Number: 160
Full Course Title: General Metals
Short Title: General Metals
TOP Code: 095630 - Machining and Machine Tools
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status B - Transferable to CSU only.
Effective Term: Summer 2021
Board of Trustees Approval Date:
2021-03-16

Course Description

This course covers the general skills of metal working: machine shop practice, welding, bench work, art metal, foundry and sheet metal, design, construction and occupational exploration.

Course Standards

Lecture Hours:
36.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
36.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
2.000
Activity Units:
0.000
Lab Units:
1.000
Min/Max Units:
3.000
Total Hours:
90.000
Grading Method:
Both - Letter with Pass/No Pass Option

Course Content

Lecture
Outline
ORIENTATION Introduction to metal shop General safety requirements Specific safety requirements
Approximate Time In Hours
4.00
Lab
Outline
ORIENTATION Introduction to metal shop General safety requirements Specific safety requirements
Approximate Time In Hours

6.00
Lecture
Outline
SAFETY Oxy aetylene welding Introduction - basic welds - electric arc welding applications
Approximate Time In Hours
4.00
Lab
Outline
SAFETY Oxy aetylene welding Introduction - basic welds - electric arc welding applications
Approximate Time In Hours
6.00
Lecture
Outline
BENCH METAL Introduction and application Projects Measuring instruments
Approximate Time In Hours
4.00
Lab
Outline
BENCH METAL Introduction and application Projects Measuring instruments
Approximate Time In Hours
6.00
Lecture
Outline
MACHINE TOOLS Lathe - operation and application Drill press - operation and application Milling machine - operation and application Power saws - operation and application
Approximate Time In Hours
4.00
Lab
Outline
MACHINE TOOLS Lathe - operation and application Drill press - operation and application Milling machine - operation and application Power saws - operation and application
Approximate Time In Hours
6.00
Lecture
Outline
FOUNDRY Principles of casting and patterns Types of patterns
Approximate Time In Hours
4.00
Lab
Outline
FOUNDRY Principles of casting and patterns Types of patterns
Approximate Time In Hours
6.00
Lecture
Outline
SHEET METAL Tools Equipment Procedures

Approximate Time In Hours
4.00
Lab
Outline
SHEET METAL Tools Equipment Procedures
Approximate Time In Hours
6.00
Lecture
Outline
METALLURGY OF STEEL AND FERROUS ALLOYS Processing Testing Uses
Approximate Time In Hours
4.00
Lab
Outline
METALLURGY OF STEEL AND FERROUS ALLOYS Processing Testing Uses
Approximate Time In Hours
6.00
Lecture
Outline
METALLURGY OF NON-FERROUS ALLOYS Processing Testing Uses
Approximate Time In Hours
4.00
Lab
Outline
METALLURGY OF NON-FERROUS ALLOYS Processing Testing Uses
Approximate Time In Hours
6.00
Lecture
Outline
FEEDS AND SPEEDS Cutting tools Lubricants
Approximate Time In Hours
4.00
Lab
Outline
FEEDS AND SPEEDS Cutting tools Lubricants
Approximate Time In Hours
6.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Ability to incorporate safety concepts into regular metal working processes.
Select metal working hand tools to produce projects or exercises within the tolerances specified on engineering drawings.
Measure and layout, utilizing semi-precision and precision measuring tools to produce and inspect projects or exercises within the tolerances specified on engineering drawings.

Set up and operate power saws, drilling machines, lathes, grinding machines and milling machines to perform machine tool operations on projects or exercises within the tolerances specified on engineering drawings.
Set up and operate shears, notchers, bar folders, box and pan breaks, spot welders, Whitney punches, and use pop rivets, tinners rivets and soft solder to produce sheet metal projects within the tolerances specified on engineering drawings.
Operate foundry equipment to produce aluminum castings within the tolerances specified on engineering drawings.
Operate welding equipment to braze, weld and cut materials to produce projects within tolerances specified on engineering drawings.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1. **SLO #1 HSS Cutting Speed and Mill Diameter:** Student will calculate the correct rotations per minute (rpm) for a high speed steel end mill using the correct cutting speed and end mill diameter.

2. **SLO #2 Tool Selection & Use:** Using proper safety procedures and precautions, students will be able to select correct metal working hand tools, measure and layout, utilizing semi-precision and precision measuring tools, and produce projects or exercises within the tolerances specified on engineering drawings.

3. **SLO #3 Casting, Welding & Cutting:** Using proper safety procedures and precautions, students will be able to operate foundry equipment to produce aluminum castings and to operate welding equipment to braze, weld and cut materials to produce projects within tolerances specified on engineering drawings.

Methods of Instruction

Demonstration
Demonstrate lecture and lab content related to course description and content; to fulfill Course Objectives and SLO's.
Internet Presentation/Resources
Online resources that are relevant to the course may be used.
Laboratory
Involve students with different hands-on lab assignments related to course description and content; to fulfill Course Objectives and SLO's.
Lecture
Lecture on topics related to course description and content; to fulfill Course Objectives and SLO's.
Multimedia presentations
Using the overhead projector, utilize video and PowerPoint presentation content related to course description and content; to fulfill Course Objectives and SLO's.
Simulation
Simulation software relevant to the course content may be used.

Methods of Evaluation
Skills demonstrations
Exams/Quizzes

Typical Assignments
Some assignments require critical thinking:
Write and submit a complete one/five page process plan to produce a workpiece on an engine lathe within the tolerance specified on engineering drawings incorporating the following operations: face, turn, drill, knurl, thread, part off and inspect.

An engine lathe is to be set-up for turning a 1.375 inches in diameter piece of cold roll (SAE-1020) steel. Answer and submit the following questions in a one-page lab report showing your work:

1. What is the cutting speed and feed per tooth for cold roll steel?

2. What are the formulas for calculating RPM and feed rates for engine lathes.

3. What is the calculated RPM and feed for the above examples?

Other Assignments:
Layout and fabricate a parallel line development sheet metal project within the tolerances specified on engineering drawings. Include and submit a sketch, one-page Bill of Materials, bend allowance calculation, one-page written procedures, and one-page written inspection report.

Course Materials
Author: LamNgeun Virasak
Title: Manufacturing Processes 4-5
Publisher: Open Oregon Educational Resources
ISBN-13: 978-1-63635-048-6
Year: 2019
Rationale for older textbook:
This textbook remains a strong fit for a General Metals course because it covers foundational metalworking processes—such as drilling, turning, and milling—that have not significantly changed over time. Its open-access format ensures equitable student access, and while newer technologies are introduced in class, this text provides a stable, cost-effective foundation to build from.
Or Equivalent: No
Author: John R. Walker and Kenneth W. Stier
Title: MODERN METALWORKING
Edition: 11th
Publisher: The Goodheart-Willcox Company, Inc.
Year: 2023

Or Equivalent: No
Other:
Notebook
Other:
Apron/shop coat
Other:
Safety glasses
Other:
Materials for projects

Minimum Qualification

Machine Tool Technology
Condition

Two Year CTE Course Review – No Proposed Changes
MTT 201 – Introduction to Aerospace Fastener Technology

Course Information

Course Discipline: MTT
Course Division: Business and Industrial Studies
Course Number: 201
Full Course Title: Introduction to Aerospace Fastener Technology
Short Title: Intro Aero Fastener Tech
TOP Code: 095630 - Machining and Machine Tools
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status B - Transferable to CSU only.
Effective Term: Fall 2021
Board of Trustees Approval Date:
2021-06-15

Course Description

In this course, students are introduced to fastener's standard measurement techniques, cold-heading (forging), thread-rolling, centerless grinding, turning, trimming, and interpretation of travelers (routers). Standard aerospace fastener industry practices, safety procedures, and set-ups are emphasized.

Course Standards

Lecture Hours:
36.000
Activity Hours:
0.000
Lab Hours:
108.000
Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
36.000
Activity Hours:
0.000
Lab Hours:
108.000
Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
2.000
Activity Units:
0.000
Lab Units:
2.000
Min/Max Units:
4.000
Total Hours:
144.000
Grading Method:
Both - Letter with Pass/No Pass Option

Course Requirements

Recommended Prep - Courses
Subject MTT - Machine Tool Technology
Requisite Course MTT 140 - Machine Shop Calculations (Active)3.000 - 3.000
Recommended Prep - Courses
Subject MTT - Machine Tool Technology
Requisite Course MTT 120 - Manufacturing Print Reading (Active)3.000 - 3.000

Course Content

Lecture
Outline
Safety and Orientation, Aerospace Fasteners technology careers Safety Follow Material Safety Data Sheets (MSDS) procedures
Approximate Time In Hours
1.00
Lab
Outline
Safety and Orientation, Aerospace Fasteners technology careers. A manufacturer's representative speaks to the class. Safety - Instructor safely points out unsafe acts to be avoided in the lab. Follow Material Safety Data Sheets (MSDS) procedures. Students fill MSDS forms and write a report on existing labels.
Approximate Time In Hours
4.00
Lecture
Outline
General Intoduction to Fasteners Definitions History of fasteners Manufacturing Methods Overview; Composites, Injection Molding, Cutting, Forming, etc. Fastener creation overview; Starting from design intent, proceeding to creating a model using Computer Aided Design/Computer Aided Manufacturing (CAD/CAM), and resulting into a finished part. This is a step-by-step procedure. Assignment, such as: Write an end of term report on how to manufacture a certain fastener i.e. bolt, screw, rivets. This is a step by step, tabulated and outlined report expressing the students' understanding on how to make a fastener. Steps will include associated drawings. Statistical Process Control (SPC) Introduction Math Basics and Application in Statistical Process Control (SPC) Fastener Print Reading Cold Heading Basic Set-up Techniques Thread rolling basics Centerless Grinding basic Set-up Operation Techniques Automatic Turning and Trimming Basic Set-up Operation Techniques Job Routers, Travelers, Work Orders, Production sheets Tooling Request
Approximate Time In Hours
3.00
Lab
Outline
General introduction to Fasteners Definitions - Students write a report on various definitions History of fasteners - Instructor quizes the students on a few history questions. Manufacturing Methods Overview; Composites, Injection Molding, Cutting, Forming, etc. - Students perform some of these procedures in the lab. The instructor will take the students to a plant to observe the procedures not available in the lab and have the students write reports on their observations. Fastener creation overview; Starting from design intent, proceeding to creating a model using Computer Aided Design/Computer Aided Manufacturing (CAD/CAM), and resulting into a finished part. This is a step-by-step procedure. The students perform these tasks on a day-to-day basis. Assignment, such as: Write an end of term report on how to manufacture a certain fastener i.e. bolt, screw, rivets. This is a step by step, tabulated and outlined report expressing the students' understanding on how to make a fastener. Steps will include associated drawings. Statistical Process Control (SPC) Introduction - Students will use the lab's tools and equipment to produce these reports. They also will use reports produced by various manufacturers to write SPC reports. Math Basics and Application in Statistical Process Control (SPC) - Students perform math exercises during lab period. Fastener Print Reading - Students read a few basic fastener prints during the lab. Cold Heading Basic Set-up Techniques - Each students repeats the instructor's basic setup in the lab for a fastener.

Thread rolling basics - Each students repeats the instructor's basic setup in the lab for a fastener. Centerless grinding basic Set-up Operation Techniques - Each students repeats the instructor's basic setup in the lab for a fastener. Automatic Turning and Trimming Basic Set-up Operation Techniques - Each students repeats the instructor's basic setup in the lab for a fastener. Job Routers, Travelers, Work Orders, Production sheets - Students fill out job routers. Tooling Request. Student fills out tool requests.
Approximate Time In Hours
16.00
Lecture
Outline
Equipment Maintenance - Basics Daily, Weekly, Monthly Operator Maintenance Requirements Checking for Oil and Lubrication Levels, and leaks Machine Guarding in Working Order Electrical Controls in Proper Order Clean machine and work Area
Approximate Time In Hours
3.00
Lab
Outline
Equipment Maintenance - Basics - Students perform the following using principles learned during lecture. Daily, Weekly, Monthly Operator Maintenance Requirements Checking for Oil and Lubrication Levels, and leaks Machine Guarding in Working Order Electrical Controls in Proper Order Clean machine and work Area
Approximate Time In Hours
12.00
Lecture
Outline
Measurement Techniques Caliper use – Internal, External, Depth Micrometer use -Internal, External, Depth, Height Concentricity/Runout Gage use Dial/Digital/Test Indicator Optical Comparator use with Micrometer or Digital Readout (DRO) Overlays Feeler (Thickness/Gap) Gages Drop Indicator Gage Pins (+/-) Gage Blocks
Approximate Time In Hours
1.00
Lab
Outline
Measurement Techniques- Students perform the following using principles learned during lecture. Caliper use – Internal, External, Depth Micrometer use -Internal, External, Depth, Height Concentricity/Runout Gage use Dial/Digital/Test Indicator Optical Comparator use with Micrometer or Digital Readout (DRO) Overlays Feeler (Thickness/Gap) Gages Drop Indicator Gage Pins (+/-) Gage Blocks
Approximate Time In Hours
5.00
Lecture
Outline
Inspection Equipment Calibration Status Calibration Sticker on Gage/Equipment/Overlay Gage/Equipment/Overlay within Calibration Interval Calibration Due Date outside of anticipated Production cycle Reference gage vs. Inspection gage
Approximate Time In Hours
1.00
Lab

Outline
Inspection Equipment Calibration Status- Students perform the following using principles learned during lecture. Calibration Sticker on gage/equipment/overlay. Students make their version of a sticker. Gage/Equipment/Overlay within calibration Interval. Each student makes a calibration chart/sticker/overlay, etc. Calibration Due Date outside of anticipated Production cycle. Reference gage vs. Inspection gage.
Approximate Time In Hours
2.00
Lecture
Outline
Important Reference Documents (borrowed from the library) ASME (American Society of Mechanical Engineers) Y14.5 (Standard for Dimensioning and Tolerancing) IFI (Industrial Fastener Institute) guide to GD&T (Geometric Dimensioning and Tolerancing) for Mechanical Fasteners Machinery's Handbook SAE (Society of Automotive Engineers) AS8879 Rev. D ASME (American Society of Mechanical Engineers) B1.1-2003 The Heading Story
Approximate Time In Hours
2.00
Lab
Outline
Important Reference Documents (borrwed from the library) - Students perform the following using principles learned during lecture. ASME (American Society of Mechanical Engineers) Y14.5 (Standard for Dimensioning and Tolerancing) IFI (Industrial Fastener Institute) guide to GD&T (Geometric Dimensioning and Tolerancing) for Mechanical Fasteners Machinery's Handbook SAE (Society of Automotive Engineers) AS8879 Rev. D ASME (American Society of Mechanical Engineers) B1.1-2003 The Heading Story
Approximate Time In Hours
1.00
Lecture
Outline
Inspection of Fastener Features (except Thread Feature Measurements) Straightness Flatness Circularity Cylindricity Concentricity/Runout Total Indicator Reading or Runout/Full Indicator Movement (TIR/FIM) Perpendicularity Angularity Parallelism True Position Squareness Profile Recess Measurements Head Protrusion Measurements Countersinks (C'sink)/ Counterbores (C'bore) Lead In chamfer and incomplete thread run Out (Thread into Shank) Surface Finish Radius
Approximate Time In Hours
6.00
Lab
Outline
Inspection of Fastener Features (except Thread Feature Measurements) - Students perform the following using the principals learned during lecture. Straightness Flatness Circularity Cylindricity Concentricity/Runout Total Indicator Reading or Runout/Full Indicator Movement (TIR/FIM) Perpendicularity Angularity Parallelism True Position Squareness Profile Recess Measurements Head Protrusion Measurements Countersinks (C'sink)/ Counterbores (C'bore) Lead In chamfer and incomplete thread run Out (Thread into Shank) Surface Finish Radius
Approximate Time In Hours
14.00

Lecture
Outline
Equipment Handling Gage cleaning procedures Gage lubrication methods and schedules Gage usage practices i.e. Not spinning a gage onto/into parts Holding a gage steady and rotating the part instead Not forcing a part onto/into Gage Using two (2) Fingers on the gage Gage storage procedures i.e. on soft Surfaces only Not dropping a gage Reasons for reporting a accidentally dropped gage to the instructors i.e. recalibration maybe required Reasons gor explaining why a gage was dropped Calibration status check procedures Machine safety procedures; guards placement and condition, etc. Emergency shut-off procedures Breaker locations Proper removal of obstructive hazards from Machines and Surroundings Material Safety Data Sheets (MSDS) Procedures
Approximate Time In Hours
2.00

Lab
Outline
Equipment Handling - Students perform the following using principles learned during lecture. Gage cleaning procedures Gage lubrication methods and schedules Gage usage practices i.e. Not spinning a gage onto/into parts Holding a gage steady and rotating the part instead Not forcing a part onto/into Gage Using two (2) Fingers on the gage Gage storage procedures i.e. on soft Surfaces only Not dropping a gage Reasons for reporting a accidentally dropped gage to the instructors i.e. recalibration maybe required Reasons gor explaining why a gage was dropped Calibration status check procedures Machine safety procedures; guards placement and condition, etc. Emergency shut-off procedures Breaker locations Proper removal of obstructive hazards from Machines and Surroundings Material Safety Data Sheets (MSDS) Procedures
Approximate Time In Hours
6.00

Lecture
Outline
Pre-Set-up Procedures on how to: Read and interpret Router and part spec for correct tooling Check for and remove any parts and Blanks from previous job Check wire size or part blank for tooling
Approximate Time In Hours
2.00
Lab
Outline
Pre-Set-up - Students perform the following using principles learned during lecture. Procedures on how to: Read and interpret Router and part spec for correct tooling Check for and remove any parts and Blanks from previous job Check wire size or part blank for tooling
Approximate Time In Hours
9.00
Lecture
Outline
Set-up Load the Wire-Coil on the reel and check wire diameter and type, or Blank diameter Check for wire Tag or Pan Tag and Job Router match
Approximate Time In Hours
4.00
Lab
Outline

Set-up - Students perform the following using principles learned during lecture. Students perform the following using principles learned during lecture. Load the Wire-Coil on the reel and check wire diameter and type, or Blank diameter Check for wire Tag or Pan Tag and Job Router match
Approximate Time In Hours
12.00
Lecture
Outline
Production Run Procedures on how to: Start after First Article Approval Make sure it has Quality Assurance (QA) stamp (Refer to section on verification of product conformation) Check and inspect parts frequently Document various cycle times i.e. run-time, down-time, etc. Implement Pan-tags or Wire-Tag Record final parts count Assure inspection buy-out before next operation
Approximate Time In Hours
5.00
Lab
Outline
Production Run - Students perform the following using principles learned during lecture. Procedures on how to: Start after First Article Approval Make sure it has Quality Assurance (QA) stamp (Refer to section on verification of product conformation) Check and inspect parts frequently Document various cycle times i.e. run-time, down-time, etc. Implement Pan-tags or Wire-Tag Record final parts count Assure inspection buy-out before next operation
Approximate Time In Hours
11.00
Lecture
Outline
Verification and Inspection of Production Conformance Measurement of part dimensional features Major and Minor diameters, Radii, Surface Finish, etc. Data recording per requirements Inspection under Microscope for conformities to print Necessity of etching of parts for detection of non-conformities in every step (Inspection, Cold-Heading, Thread-Rolling) Lab sample submittal requirements per Material Safety Data Sheets (SPC)
Approximate Time In Hours
2.00
Lab
Outline
Verification and Inspection of Production Conformance - Students perform the following using principles learned during lecture. Measurement of part dimensional features Major and Minor diameters, Radii, Surface Finish, etc. Data recording per requirements Inspection under Microscope for conformities to print Necessity of etching of parts for detection of non-conformities in every step (Inspection, Cold-Heading, Thread-Rolling) Lab sample submittal requirements per Material Safety Data Sheets (SPC)
Approximate Time In Hours
5.00
Lecture
Outline
Visual Inspection /Examination Surface Condition Burrs Tool Marks Nicks, Dings, Gouges, Scratches Indications, Discontinuities
Approximate Time In Hours
1.00

Lab
Outline
Visual Inspection /Examination - Students perform the following using principles learned during lecture. Surface Condition Burrs Tool Marks Nicks, Dings, Gouges, Scratches Indications, Discontinuities
Approximate Time In Hours
5.00
Lecture
Outline
Data Collection Basics of Statistical Process Control (SPC) Data recording using Statistical Process Control (SPC) Software Filling out inspection reports Manual charting
Approximate Time In Hours
2.00
Lab
Outline
Data Collection - Students perform the following using principles learned during lecture. Basics of Statistical Process Control (SPC) Data recording using Statistical Process Control (SPC) Software Filling out inspection reports Manual charting
Approximate Time In Hours
3.00
Lecture
Outline
General Evaluation Criteria in the workplace Punctuality and participation Listenning skills Learning skills Sharing skills Positive attitude Personal Initiative Mechanical Aptitude Learning Progress Problem Identification and Resolution Skills Trouble Shooting Skills Following Instructions and Procedures Team Participation
Approximate Time In Hours
1.00
Lab
Outline
General Evaluation Criteria in the workplace - Students perform the following using principles learned during lecture. Punctuality and participation Listenning skills Learning skills Sharing skills Positive attitude Personal Initiative Mechanical Aptitude Learning Progress Problem Identification and Resolution Skills Trouble Shooting Skills Following Instructions and Procedures Team Participation
Approximate Time In Hours
3.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Lecture
Demonstrate manufacturing shop safety practices with 100% accuracy.
Lab
Read Micrometers, Calipers, Thread-Pitch Gauges, Go/No-Go Gauges, Comparators, Stereoscopic instruments, and other measuring tools to verify conformation to engineering requirements.
Lab
Perform Class Project - Part creation from conception to conclusion.

Lecture
Record inspection results on inspection sheets, and submit first article.
Lecture
Read and interpret typical Aerospace Fasteners' engineering drawings.
Lab
Use a microscope or a stereo scope to study the crystal structures and faults in fasteners manufactured and compare to industy's metallurgical standards.
Lecture
Use proper measuring tools and methods and industry accpeted standards such as Statsitical Process Control (SPC) basics to inspection fastenrs manufactured in the class.
Lecture
Use the basic mathematical concepts of addition, subtraction, multiplication, and division to perform standard industry calculations.
Lab
Use Cold Heading, Center-less Grinding, Thread Rolling, Automatic Turning, and Trimming to fabricate fasteners according to Fastener Manufacturing standards.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1. SLO 1. Students will be able to repeat the instructor's setup procedures for a Cold Heading Basic Set-up Technique.

2. SLO 2. Given a blueprint for a fastener, the student will be able to read and comprehend some of the basic callouts listed.

3. SLO 3. Given a fastener, the student will be able to use the proper measurement tools to determine thread details and use those findings to determine if the fastener conforms to engineering requirements.

Methods of Instruction

Laboratory
Using a variety of manufacturing machines, students will perform part creation from conception to conclusion. Use proper measuring tools and methods and industry accepted standards to inspect fasteners and parts manufactured in the class. Practice and demonstrate proper shop safety and equipment maintenance.
Lecture
Speak in detail on the subject of aerospace fasteners. General topics include the history and importance of fasteners, the fastener standards, and the manufacturing processes needed to create fasteners that meet the detailed specifications.

Methods of Evaluation

Skills demonstrations
Exams/Quizzes

Typical Assignments

Some assignments require critical thinking:

Write manufacturing and inspection procedures to fabricate fasteners. Give step by step detail of each pre-fabrication, fabrication, equipment used, inspection procedure, inspection tools, post fabrication procedure.

1. Use the Cold Header to manufacture a 1 inch long pan head blank as per drawing on page #1.
2. Inspect and Measure the product against the drawing and record the results in the measurements table on page #4.
3. Run the cold-headed blank through the centerless grinder and grind to dimensions called out on drawing on page #2.
4. Inspect and Measure the product against the drawing and record the results in the measurements table on page #4.
5. Run the centerless-ground blank through the thread-roller using thread specifications noted on page #3.
6. Inspect and Measure the product against the drawing and record the results in the measurements table on page #4.
7. If you missed a specification, record reasoning as to why. Use the space provided on page #4
8. State how next time you would do it differently. Use the space allotted on page #5 to enter your response.
9. Tape the part on the space provided on page #5 on the spot provided.
10. Hand the packet to the instructor and get a receipt of delivery of assignment from him or her.

Other Assignments:

Inspect a Fastener and evaluate it against related engineering specifications:

1. Cold Head a Blank
2. Grind Cold-Headed Blank
3. Thread-Roll the Cold-Headed Blank
4. Use an Optical Comparator to correlate with spec
5. Use GO/No-Go Gauge to verify thread fit.
6. Visually inspect & submit reports to instructor.

Course Materials

Author: LamNgeun Virasak
Title: Manufacturing Processes 4-5
Publisher: Open Oregon Educational Resources
Year: 2019
Or Equivalent: No
Author: Industrial Fasteners Institute
Title: Inch Fastener Standards
Edition: 11th
Publisher: Industrial Fasteners Institute
Year: 2021
Or Equivalent: No
Author: Erik Oberg, Franklin D. Jones, Holbrook Horton and Henry Ryffel
Title: Machinery's Handbook
Edition: 31
Publisher: Industral Press Inc.
Year: 2020

Or Equivalent: No
Other:
Safety Glasses(Goggles) 2. Hearing protection 3. Calculator 4. Hair containment 5. Long Pants 6. Close Toed Shoes 7. 1-inch Three-Ring Binder

Minimum Qualification

1. Machine Tool Technology
Condition

Two Year CTE Course Review – No Proposed Changes -- MTT 203 – Advanced Inspection of Fasteners and Measuring Instruments

Course Information

Course Discipline: MTT
Course Division: Business and Industrial Studies
Course Number: 203
Full Course Title: Advanced Inspection of Fasteners and Measuring Instruments
Short Title: Adv. Fastener & Instr Insp
TOP Code: 095630 - Machining and Machine Tools
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status B - Transferable to CSU only.
Effective Term: Fall 2021
Board of Trustees Approval Date:
2021-06-15

Course Description

Students are introduced to advanced fastener inspection. Standard measurement techniques with focus on microscopes, thread pitch gauges, Go and No-Go gauges, micrometers, indicators, calipers, gauge-blocks, plug gauges, comparator, and interpretation of travelers. Standard aerospace fastener industry practices are emphasized.

Course Standards

Lecture Hours:
36.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
36.000
Activity Hours:
0.000
Lab Hours:
54.000
Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
2.000
Activity Units:
0.000
Lab Units:
1.000
Min/Max Units:
3.000
Total Hours:
90.000
Grading Method:
Both - Letter with Pass/No Pass Option

Course Requirements

Recommended Prep - Courses
Subject MTT - Machine Tool Technology
Requisite Course MTT 120 - Manufacturing Print Reading (Active)3.000 - 3.000
Recommended Prep - Courses
Subject MTT - Machine Tool Technology
Requisite Course MTT 140 - Machine Shop Calculations (Active)3.000 - 3.000
Prerequisite
Subject MTT - Machine Tool Technology
Requisite Course MTT 201 - Introduction to Aerospace Fastener Technology (Active)4.000 - 4.000

Course Content

Lecture
Outline
Safety and Orientation Aerospace Fasteners technology careers Shop Safety Inspection Lab Safety Follow Material Safety Data Sheets (MSDS) Procedures
Approximate Time In Hours
1.50
Lab
Outline
Safety and Orientation - Instructor practically demonstrates lecture items in the lab. Aerospace Fasteners technology careers Shop Safety Inspection Lab Safety Follow Material Safety Data Sheets (MSDS) Procedures
Approximate Time In Hours
4.50
Lecture
Outline
Thread Terminology Thread Features Thread Call-Outs -Inch and Metric Thread Styles- Screw, Pipe, ACME, etc. Thread Forms- UN I UNR I UNF I UNJF etc. Screw Threads- Special, Modified, Truncated, etc. Plating on Thread Dimensions
Approximate Time In Hours
4.50
Lab
Outline
Thread Terminology - Student observe various thread forms using a comparator and under a stereoscop and afterward free hand-sketch what they see and keep the sketch in their 3-ring binder for instructors review. Thread Features Thread Call-Outs -Inch and Metric Thread Styles- Screw, Pipe, ACME, etc. Thread Forms- UN I UNR I UNF I UNJF etc. Screw Threads- Special, Modified, Truncated, etc. Plating Build-Up on Thread Dimensions.
Approximate Time In Hours
8.50
Lecture
Outline
General Standard Measurement Techniques Choosing the right Tool and appropriate Precision for given Features, Measurements, Conditions Caliper use –Internal, External, Depth-Vernier, Dial, Digital Micrometer use -Internal, External, Depth-Vernier, Digital Concentricity/Runout Gauge / Roundness Test Instrument Dial/Digital/Test Indicator Optical Comparator Overlays Surface Plate Feeler (Thickness/Gap) Gauges Drop Indicator Gauge Pins (+/-) Height Gauge Gauge Blocks Surface Finish Comparator / Profilometer Accuracy vs. Precision Maximum material condition (MMC) vs. Least material condition (LMC) Coordinate measurement machine (CMM) Nondestructive testing (NDT) i.e. Mag Particle Inspector Coating Thickness Gauge Tensile Testing Gauge
Approximate Time In Hours
5.00
Lab
Outline

General Standard Measurement Techniques- Students perform projects related to every lecture item and record their results. Choosing the right Tool and appropriate Precision for given Features, Measurements, Conditions Caliper use –Internal, External, Depth-Vernier, Dial, Digital Micrometer use -Internal, External, Depth-Vernier, Digital Concentricity/Runout Gauge / Roundness Test Instrument Dial/Digital/Test Indicator Optical Comparator Overlays Surface Plate Feeler (Thickness/Gap) Gauges Drop Indicator Gauge Pins (+/-) Height Gauge Gauge Blocks Surface Finish Comparator / Profilometer Accuracy vs. Precision Maximum material condition (MMC) vs. Least material condition (LMC) Coordinate measurement machine (CMM) Nondestructive testing (NDT) i.e. Mag Particle Inspector Coating Thickness Gauge Tensile Testing Gauge
Approximate Time In Hours
5.00
Lecture
Outline
Equipment Calibration Status Calibration Sticker on Gauge/Equipment/Overlay Gauge/Equipment/Overlay within Calibration Interval Anticipate calibration so that instruments will be available during production. Reference gauge vs. Inspection gauge
Approximate Time In Hours
1.50
Lab
Outline
Equipment Calibration Status - Students perform projects related to every lecture item and record their results. Calibration Sticker on Gauge/Equipment/Overlay Gauge/Equipment/Overlay within Calibration Interval Anticipate calibration so that instruments will be available during production. Reference gauge vs. Inspection gauge
Approximate Time In Hours
4.50
Lecture
Outline
Important Reference Documents to know Society of Automotive Engineers (SAE) AS8879- Screw Threads- UNJ Profile, Inch, Controlled Radius Root with Increased Minor Diameter Society of Automotive Engineers (SAE) AS6062- Bolts, Screws, and Studs, Screw Thread Requirements Society of Automotive Engineers (SAE) AS6063- Bolts, Screws, and Studs, Geometric Control Requirements American Society of Mechanical Engineers (ASME) Y14.5- Dimensioning and Tolerancing International Fastener Institute (IFI) Guide to geometric dimensioning and tolerancing (GD&T) for Mechanical Fasteners
Approximate Time In Hours
0.50
Lecture
Outline
Important Reference Documents to know - Students perform projects related to every lecture item and record their results. Society of Automotive Engineers (SAE) AS8879- Screw Threads- UNJ Profile, Inch, Controlled Radius Root with Increased Minor Diameter Society of Automotive Engineers (SAE) AS6062- Bolts, Screws, and Studs, Screw Thread Requirements Society of Automotive Engineers (SAE) AS6063- Bolts, Screws, and Studs, Geometric Control Requirements American Society of Mechanical Engineers (ASME) Y14.5- Dimensioning and Tolerancing International Fastener Institute (IFI) Guide to geometric dimensioning and tolerancing (GD&T) for Mechanical Fasteners

Approximate Time In Hours
1.50
Lecture
Outline
Inspection of Fastener Features (except Thread Feature Measurements) Straightness Flatness Circularity/Roundness Cylindricity Concentricity TIR (total indicator reading)/FIM (full indicator movement) Perpendicularity Angularity Parallelism True Position Squareness Profile Recess Measurements Head Protrusion Measurements Countersinks (C'sink)/ Counterbores (C'bore) lead In (Chamfer and incomplete Thread);Run Out (Thread into Shank) Surface Finish Radii
Approximate Time In Hours
9.00
Lab
Outline
Inspection of Fastener Features (except Thread Feature Measurements) - Students perform projects related to every lecture item and record their results. Straightness Flatness Circularity/Roundness Cylindricity Concentricity TIR (total indicator reading)/FIM (full indicator movement) Perpendicularity Angularity Parallelism True Position Squareness Profile Recess Measurements Head Protrusion Measurements Countersinks (C'sink)/ Counterbores (C'bore) lead In (Chamfer and incomplete Thread);Run Out (Thread into Shank) Surface Finish Radii
Approximate Time In Hours
7.00
Lecture
Outline
Equipment Handling Keep Equipment and Gauges clean Use Gauge lube as appropriate Do not spin Gauges onto/into Parts, hold Gauge steady and rotate Part Do not force Part onto/into Gauge; use two (2) Fingers only Place Gauges on soft Surfaces only Do not drop Gauges If dropped, Recalibration is required Heavy Gauge Use requires frequent Calibration Status Check
Approximate Time In Hours
1.00
Lab
Outline
Equipment Handling - Students perform projects related to every lecture item and record their results. Keep Equipment and Gauges clean Use Gauge lube as appropriate Do not spin Gauges onto/into Parts, hold Gauge steady and rotate Part Do not force Part onto/into Gauge; use two (2) Fingers only Place Gauges on soft Surfaces only Do not drop Gauges If dropped, Recalibration is required Heavy Gauge Use requires frequent Calibration Status Check
Approximate Time In Hours
3.00
Lecture
Outline
Thread Inspection A. External Threads I. Attribute Gauging a. GO and NO-GO Thread Ring Gauges b. Root Radii Min/Max Comparator Overlay II. Variables Gauging a. Pitch Dia - Tri-Roll/Cone/ V Gauge - 3-Wire Measurement - Pitch Micrometer (Ref. only) b. Major Dia- Micrometer c. Minor Dia- Optical Comparator d. Root Radii- Optical Comparator e. Multi Roll or Multi-Rib Segment (Multi-Element) Gauge for Functional Measurements f. Lead Error g. Half Angle B. Internal Threads II. Attribute Gauging a. GO and NO-GO Thread Plug Gauges b. Min/Max Cylindrical pin for Minor Dia Verification c.

Countersink/Chamfer gauging III. Variable Gauging a. Pitch Dia – Internal Thread Comparator b. Minor Dia- Pin gauges c. Countersink Dia, Included Angle d. Multi-Rib Segment (Multi-Element) Gauge for Functional Measurements
Approximate Time In Hours
5.00
Lab
Outline
Thread Inspection - Students perform projects related to every lecture item and record their results. A. External Threads I. Attribute Gauging a. GO and NO-GO Thread Ring Gauges b. Root Radii Min/Max Comparator Overlay II. Variables Gauging a. Pitch Dia - Tri-Roll/Cone/ V Gauge - 3-Wire Measurement - Pitch Micrometer (Ref. only) b. Major Dia- Micrometer c. Minor Dia- Optical Comparator d. Root Radii- Optical Comparator e. Multi Roll or Multi-Rib Segment (Multi-Element) Gauge for Functional Measurements f. Lead Error g. Half Angle B. Internal Threads II. Attribute Gauging a. GO and NO-GO Thread Plug Gauges b. Min/Max Cylindrical pin for Minor Dia Verification c. Countersink/Chamfer gauging III. Variable Gauging a. Pitch Dia – Internal Thread Comparator b. Minor Dia- Pin gauges c. Countersink Dia, Included Angle d. Multi-Rib Segment (Multi-Element) Gauge for Functional Measurements
Approximate Time In Hours
9.00
Lecture
Outline
Visual Inspection /Examination Surface Texture Burrs Tool Marks Nicks, Dings, Gouges, Scratches Indications of discontinuities - folds, cracks, laps, and seams or any other irregularities
Approximate Time In Hours
1.50
Lab
Outline
Visual Inspection /Examination - Students perform projects related to every lecture item and record their results. Surface Texture Burrs Tool Marks Nicks, Dings, Gouges, Scratches Indications of discontinuities - folds, cracks, laps, and seams or any other irregularities
Approximate Time In Hours
4.50
Lecture
Outline
Data Collection Knowledge of SPC (Statistical Process Control) Data Recording using SPC (Statistical Process Control) Software Filling out Inspection Reports Manual Charting
Approximate Time In Hours
4.00
Lab
Outline
Data Collection - Students perform projects related to every lecture item and record their results. Knowledge of Statistical Process Control (SPC) Data Recording using Statistical Process Control (SPC) Software Filling out Inspection Reports Manual Charting
Approximate Time In Hours
5.00
Lecture

Outline
GENERAL EVALUATION CRITERIA Punctuality and Participation Willingness to listen, learn, and share Positive Attitude Personal Initiative Mechanical Aptitude Learning Progress Problem Identification and Resolution Skills Trouble Shooting Skills Following Instructions and Procedures Team Participation
Approximate Time In Hours
1.00
Lab
Outline
GENERAL EVALUATION CRITERIA - Students perform projects related to every lecture item and record their results. Punctuality and Participation Willingness to listen, learn, and share Positive Attitude Personal Initiative Mechanical Aptitude Learning Progress Problem Identification and Resolution Skills Trouble Shooting Skills Following Instructions and Procedures Team Participation
Approximate Time In Hours
3.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Lecture
Demonstrate manufacturing shop safety practices with 100% accuracy.
Lab
Read Micrometers, Dial Calipers, Thread pitch gauges, Go and No-Go gauges, and other Metrology measuring tools to measure projects within the tolerances specified by engineering requirements.
Lab
Use Optical Comparators and Stereoscopic instruments to verify conformity to GD&T specifications as specified in engineering drawings.
Lecture
Record inspection results on routers.
Lecture
Read and interpret typical aerospace fastener engineering drawings.
Lab
Communicate inspection results verbally and in writing with concerned parties.
Lecture
Set up and use a Coordinate Measuring Machine (CMM) machine.
Lab
Apply fasteners engineering quality standards.
Lecture
Apply addition, subtraction of decimal and fractions to engineering problems.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1. SLO 1. Read and interpret typical aerospace fastener engineering drawings.

2. SLO 2. Choose and use the proper precision inspection instruments to verify conformity to Geometry, Dimensions and Tolerancing (GD&T) specifications as specified in engineering drawings.

3. SLO 3. Document and communicate inspection results verbally and in writing with concerned parties.

Methods of Instruction

Laboratory
Using a variety of manufacturing machines, students will perform part creation from conception to conclusion. Use proper measuring tools and methods and industry accepted standards to inspect fasteners and parts manufactured in the class. Practice and demonstrate proper shop safety and equipment maintenance.
Lecture
Speak in detail on the subject of aerospace fasteners. General topics include the history and importance of fasteners, the fastener standards, and the manufacturing processes needed to create fasteners that meet the detailed specifications.

Methods of Evaluation

Skills demonstrations
Exams/Quizzes

Typical Assignments

Some assignments require critical thinking:
Write inspection procedures, select inspection equipment to verify various fasteners' conformity to their associated engineering drawings and specifications provided. Specify each operation and the tools needed to complete the inspection. Submit completed procedures to the instructor for evaluation.

1- Inspect the three fasteners handed to you for the criteria noted on page #1.

2- Compare your findings to the engineering specification given to you on page #2.

3- Record your findings and variations from engineering specifications on page #3.

4- Display the results in the Statistical Process Control (SPC) tables and charts formats asked shown on page #4.

5- Note if any of your instruments may have been out of calibration.

6- Submit the samples and your results to the instructor.

Other Assignments:
Inspect Fasteners and evaluate them against related Engineering specifications:

1. Use an Optical Comparator with overlays to determine correlations.

2. Use Go and No-Go gages to verify thread fit.

3. Visually inspect and submit SPC reports to the instructor for evaluation.

4. Detect indications and discontinuities.

5 Submit inspection reports with Coordinate Measuring Machine (CMM) analysis.

Course Materials

Author: LamNgeun Virasak
Title: Manufacturing Processes 4-5
Publisher: Open Oregon Educational Resources
Year: 2019
Or Equivalent: No
Author: Industrial Fasteners Institute
Title: Inch Fastener Standards
Edition: 11th
Publisher: Industrial Fasteners Institute
Year: 2021
Or Equivalent: No
Author: Erik Oberg, Franklin D. Jones, Holbrook Horton and Henry Ryffel
Title: Machinery's Handbook
Edition: 31
Publisher: Industrial Press
Year: 2020
Or Equivalent: No
Other:
SAE AS8879- Screw Threads- UNJ Profile, Inch, Controlled Radius Root with Increased Minor Diameter Can be borrowed from the school library.
Other:
Safety Glasses(Goggles) 2. Hearing protection 3. Calculator 4. Hair Containment 5. Long Pants 6. Closed Toed Shoes 7. 1-inch Three-Ring Binder
Other:
SAE AS6062- Bolts, Screws, and Studs, Screw Thread Requirements Can be borrowed from the school library.
Other:
SAE AS6063- Bolts, Screws, and Studs, Geometric Control Requirements Can be borrowed from the school library.
Other:
ASME Y14.5- Dimensioning and Tolerancing. Can be borrowed from the school library.
Other:
IFI (Industrial Fasteners Institute) guide to GD&T for Mechanical Fasteners Can be borrowed from the school library.

Minimum Qualification

1. Machine Tool Technology

Condition

New Course – Second Read – CA 100 – Sanitation and Safety

Course Information

Course Discipline: CA
Course Division: Business and Industrial Studies
Course Number: 100
Full Course Title: Sanitation and Safety
Short Title: Sanitation and Safety
TOP Code: 130630 - Culinary Arts
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status C - Not transferable
Effective Term: Fall 2025

Course Description

An introduction to the basic principles of sanitation and safety applied in the culinary industry and the use and care of institutional food service equipment. Emphasis is on the importance of proper employee training practices as related to food safety. ServSafe Food Protection Management Certification can be obtained upon successfully passing the class, but not mandatory.

Course Standards

Lecture Hours:
36.000
Activity Hours:
Lab Hours:
Outside-of-Class Hours:

72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
36.000
Activity Hours:

Lab Hours:

Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
2.000
Activity Units:

Lab Units:

Min/Max Units:
2.000
Total Hours:
36.000
Grading Method:
Letter grade only

Course Content

Lecture
Outline
1. Overview of Food Safety and Sanitation
Approximate Time In Hours
4.00
Lecture
Outline
2. Introduction to the Microworld
Approximate Time In Hours
4.00
Lecture
Outline
3. Flow of Food I (Purchasing, Receiving, Storing)
Approximate Time In Hours
4.00
Lecture
Outline

4. Flow of Food II (Preparation, Service, Re-Storing, Re-Serving)
Approximate Time In Hours
4.00
Lecture
Outline
5. Cleaning and Sanitizing
Approximate Time In Hours
4.00
Lecture
Outline
6. Pest Management
Approximate Time In Hours
4.00
Lecture
Outline
7. Safety Regulations
Approximate Time In Hours
4.00
Lecture
Outline
8. Employee training
Approximate Time In Hours
4.00
Lecture
Outline
9. Bio Hazard and Terroism
Approximate Time In Hours
4.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Lecture
1. Identify microorganisms, symptoms, and illness related to food spoilage, and food-borne illness, and prevention techniques.
Lecture
2. Demonstrate good personal hygienes and health habits in addition to cleaning and sanitizing equipment, facilities and work areas.
Lecture
3. Demonstrate the use of acceptable procedures when preparing potentially hazardous foods, including time and temperature (TDZ) principles.
Lecture
4. Designing a safe operation: Facility equipment selection, maintaining kitchen equipment and build-in and cleaning program.
Lecture

5. Including the Integrated Pest Management (IPM) program working with a pest control operator (PCO) using and storing pesticides. Voluntary self-inspection to maintain industry standards.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1. 1. Students will analyze and assess the role of the culinary industry as it relates to the safe preparation of food. Standard and governmental guidelines will be used as an assessment tool.

2. 2. Students will inspect and evaluate the quality of a food service operation safety and sanitation program using the nationally recognized assessment tool from the National Restaurant Association and the Los Angeles Environmental Health Department.

3. 3. Students will certify in a national competency exam called ServSafe and pass with a 75 % score.

Methods of Instruction

Discussion
Group Activities
Guest Speakers
Internet Presentation/Resources
Lecture
Multimedia presentations
Role Play

Methods of Evaluation

Substantial writing assignments
Problem solving demonstrations (computational or non-computational)
Exams/Quizzes

Typical Assignments

Reading Assignments:
Various articles and journals and magazines such as the educational foundation of the national restaurant association. ServSafe journals, ServSafe coursework book, ServSafe essentials, and the HACCP training manual.

Course Materials

Author: National Restaurant Association
Title: ServSafe Coursebook
Edition: 8th
Publisher: National Restaurant Association
ISBN-13: 978-0-86612-709-7
Year: 2022
Or Equivalent: No

Minimum Qualification

1. Culinary Arts/Food Technology

Condition

New Course – Second Read – CA 101 – Culinary Arts Orientation and Techniques

Course Information

Course Discipline: CA
Course Division: Business and Industrial Studies
Course Number: 101
Full Course Title: Culinary Arts Orientation and Techniques
Short Title: CA Orientation &Techniques
TOP Code: 130630 - Culinary Arts
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status C - Not transferable
Effective Term: Fall 2025

Course Description

Students will learn the fundamentals of food preparation and fabrication, focus on quality standards of production, and apply basic cooking techniques used in modern commercial kitchens. Laboratory practicum includes knife skills, cookery of starch and vegetables, preparing stock and mother sauces, and fabrication of poultry, meats, and seafood. High standards of professionalism, sanitation, kitchen safety, and work habits are emphasized.

Course Standards

Lecture Hours:
36.000
Activity Hours:
72.000
Lab Hours:
0.000
Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
36.000
Activity Hours:
72.000
Lab Hours:
0.000
Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
2.000
Activity Units:
2.000
Lab Units:
0.000
Min/Max Units:
4.000
Total Hours:
108.000
Grading Method:
Letter grade only

Course Requirements

Prerequisite
Subject CA - Culinary Arts
Requisite Course CA 100 - Sanitation and Safety (In Review)0.000 - 0.000

Course Content

Lecture
Outline
1. Review Course Syllabus

Approximate Time In Hours
3.00
Lecture
Outline
2. Introduction to the Culinary World
Approximate Time In Hours
3.00
Lecture
Outline
3. Safety and Sanitation
Approximate Time In Hours
3.00
Lecture
Outline
4. Equipment Identification and Knife Skills
Approximate Time In Hours
3.00
Lecture
Outline
5. Mise en place
Approximate Time In Hours
3.00
Lecture
Outline
6.Weights and Measures
Approximate Time In Hours
3.00
Lecture
Outline
7. Recipes
Approximate Time In Hours
3.00
Lecture
Outline
8. Cooking Principles and Techniques
Approximate Time In Hours
3.00
Lecture
Outline
9. Stocks/Soups/ Sauces
Approximate Time In Hours
3.00
Lecture
Outline
10. Vegetable and Starch Cookery
Approximate Time In Hours

3.00
Lecture
Outline
11. Basic Baking
Approximate Time In Hours
3.00
Lecture
Outline
12. Written Final Exam
Approximate Time In Hours
3.00
Activity
Outline
1.Introduction to the Commercial Kitchen
Approximate Time In Hours
8.00
Activity
Outline
2. Knife Skills
Approximate Time In Hours
8.00
Activity
Outline
3.Basic Cooking Techniques
Approximate Time In Hours
8.00
Activity
Outline
4. Basic preparation techniques
Approximate Time In Hours
8.00
Activity
Outline
5. Preparation of stocks
Approximate Time In Hours
8.00
Activity
Outline
6.Preparation of Sauces
Approximate Time In Hours
8.00
Activity
Outline
7. Vegetable and Starch Cookery
Approximate Time In Hours
8.00

Activity
Outline
8. Basic baking
Approximate Time In Hours
8.00
Activity
Outline
9. Manipulative final exam
Approximate Time In Hours
8.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Lecture
1. Discuss the history of culinary arts, past and present.
Lecture
2. Describe cooking principles and techniques
Lecture
3. Understand the recipe
Lecture
4. Apply weights and measures
Lecture
5. Explain mise en place
Lecture
6. Identify equipment
Lecture
7. Understand vegetables and starch cookery
Lecture
8. Understand meat and fish fabrication and cookery
Lab
1. Use and indentify proper equipment
Lab
2. Apply basic cooking principles: Dry heat and moist heat
Lab
3. Prepare quality white and brown stocks
Lab
4. Prepare mother sauces and thinking agents
Lab
5. Understand soups: cle, puree, cream, chowders, and bisque
Lab
6. Understand meat cookery: beef, poultry, pork, and fish using dry and moist heat methods.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1. 1. Evaluate food items and revise finished recipes.

2. 2. Prepared food items according to classic cooking methods and standards.

3. 3. Define and explain and apply culinary terminology in the kitchen environment, cooking, processe and evaluate completed products.

Methods of Instruction

Demonstration
Discussion
Field trips
Group Activities
Guest Speakers
Laboratory
Lecture
Multimedia presentations
Role Play

Methods of Evaluation

Problem solving demonstrations (computational or non-computational)
Skills demonstrations
Exams/Quizzes

Typical Assignments

Reading Assignments:
Students will evaluate recipes and prepare a synopsis of the final recipe.

Other Assignments:
Read journals and magazines

Course Materials

Author: Sarah Labensky
Title: On Cooking
Edition: 8th
Publisher: Pearson
Year: 2022
Or Equivalent: No

Minimum Qualification

1. Culinary Arts/Food Technology

Condition

New Course – Second Read – CA 102 – Culinary Nutrition

Course Information

Course Discipline: CA
Course Division: Business and Industrial Studies
Course Number: 102
Full Course Title: Culinary Nutrition
Short Title: Culinary Nutrition
TOP Code: 130630 - Culinary Arts
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status C - Not transferable

Course Description

This course provides a concise overview of applied culinary nutrition. Recipes and menu development, including ingredient selection and cooking techniques for special diets, are discussed. Appropriate for food service professionals interested in working as personal chefs, sports teams, spas, resorts, entertainment, major hospitals, and healthcare facilities.

Course Standards

Lecture Hours:
36.000
Activity Hours:
Lab Hours:
Outside-of-Class Hours:

72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
36.000
Activity Hours:

Lab Hours:

Outside-of-Class Hours:
72.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
2.000
Activity Units:

Lab Units:

Min/Max Units:
2.000
Total Hours:
36.000
Grading Method:
Letter grade only

Course Content

Lecture
Outline
The art and science of nutritional cooking
Approximate Time In Hours
3.00
Lecture
Outline
The basic nutrients
Approximate Time In Hours
3.00
Lecture
Outline
Nutritional Standards and Guidelines
Approximate Time In Hours
3.00
Lecture
Outline

Energy Nutrients-Carbohydrates, proteins and Lipids
Approximate Time In Hours
3.00
Lecture
Outline
Vitamins, Minerals and Water
Approximate Time In Hours
3.00
Lecture
Outline
Market and Menu Assessment
Approximate Time In Hours
3.00
Lecture
Outline
Cooking for Health: Using Culinary Skills
Approximate Time In Hours
3.00
Lecture
Outline
Food Allergens and Special Dietary Requests
Approximate Time In Hours
3.00
Lecture
Outline
Developing Staff and Defining Responsibilities
Approximate Time In Hours
3.00
Lecture
Outline
Marketing and Evaluating Nutrition Programs
Approximate Time In Hours
3.00
Lecture
Outline
Menu Labeling
Approximate Time In Hours
3.00
Lecture
Outline
Written Final Exam
Approximate Time In Hours
3.00

General Education/Transfer

1. **Local GE/Graduation Requirements:**
    - 5 – Health and Physical Education

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Lecture
Discuss factors that influence food selection, basic nutrition concepts, and the characteristics of a nutritious die
Lecture
Analyze the dietary guidelines for Americans. Evaluate food labels according to the Nutrition Facts panel. Measure portion sizes for foods representing the five food groups.
Lecture
Compare the categories and functions of carbohydrates. Explain the digestion and metabolism of carbohydrates.
Lecture
Evaluate the dietary recommendations for fats. Define the categories of lipids. List the functions of lipids. Differentiating terms associated with lipids include trans fatty acids, essential fatty acids, rancidity, cholesterol, and lecithin. Examine the structure, functions, and recommendations for protein intake.
Lecture
Appraise the characteristics and functions of minerals. List the functions of water in the diet. Differentiate between fat-soluble and water-soluble vitamins. Identify the characteristics and functions of fat and water-soluble vitamins.
Lecture
Evaluate the dietary links between food and cardiovascular disease, cancer, and diabetes. Compare and contrast the types of vegetarians and foods eaten by each. Examine obesity in America, its causes and treatment. Create menus for weight maintenance.
Lecture
Analyze a menu for profitability, apply menu engineering to menu analysis, and apply menu scoring methods to menu analysis. Evaluate the interrelationships a menu has with each department in food service. Appraise the criteria used to determine specific menu listings and the importance of utilizing descriptive terminology used to sell menu listings.
Lecture
Describe elements of selling banquet packages. Differentiate between banquet and show menus. Describe the advantages that a buffet offers over traditional menus. Explain the various timeframes for cycle menus, the two categories of cafeterias, and the principles of writing cafeteria menus.
Lecture
Examine how speed, holding quality, packaging, and minimal handling affect decision-making when planning menus for quick-service restaurants. Examine the guidelines for pricing, staffing, and complexity of the listing of coffee shops.
Lecture
Explain the various timeframes for cycle menus, the two categories of cafeterias, and the principles of writing cafeteria menus.

Student Learning Outcomes

Upon completion of this course, the student should be able to:

1. 1. **Design menus for full-service facilities utilizing demographics research. Differentiate between different menus needed for various retail and contract facilities.**

2. 2. **Examine the needs of an operation's menu using demographics, menu mix and theme, nutritional value and integrate the capabilities of staff and the limitations of the facility.**

3. **3.Appraise the balanced nutritional menu created for an operation and evaluate the importance of basic nutrition for restaurants and the food service industry.**

Methods of Instruction

Demonstration
Discussion
Group Activities
Guest Speakers
Internet Presentation/Resources
Lecture
Multimedia presentations
Role Play
Simulation

Methods of Evaluation

Substantial writing assignments
Problem solving demonstrations (computational or non-computational)
Skills demonstrations
Exams/Quizzes

Typical Assignments

Some assignments require critical thinking:
Create menu with nutritional analysis, income statement analysis, cost applications for menus, menu layouts, menu engineering, and menu scoring

Reading Assignments:
1. Readings from the course textbooks.

2. Online publications.

Writing Assignments:
1. Short essay.

2. Reseaech papers.

Course Materials

Author: Pearson
Title: Nutrition for Foodservice & Culinary Professionals
Edition: 10th Edition
Publisher: Pearson
Year: 2022
Or Equivalent: No

Minimum Qualification

1. Culinary Arts/Food Technology
Condition

New Course – Second Read – CA 103 – Culinary Skills I

Course Information

Course Discipline: CA
Course Division: Business and Industrial Studies
Course Number: 103
Full Course Title: Culinary Skills I
Short Title: Culinary Skills I
TOP Code: 130630 - Culinary Arts
SAM Code: C - Clearly Occupational
Is this a credit or noncredit course? D - Credit - Degree Applicable
Transfer Status C - Not transferable

Course Description

This course covers essential culinary foundations, including classic knife cuts, basic cooking methods of meats, eggs, and breakfast cookery, terminology, equipment, measurements, culinary math, and ingredients, are covered. Students practice skills in the kitchen to enhance their experience in a real environment setting.

Course Standards

Lecture Hours:
36.000
Activity Hours:
72.000
Lab Hours:
0.000

Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:
Lecture Hours:
36.000
Activity Hours:
72.000
Lab Hours:
0.000
Outside-of-Class Hours:
108.000
Min and Max Total Regularly Scheduled Hours of instruction required for student to achieve course objectives:

Lecture Units:
2.000
Activity Units:
2.000
Lab Units:
0.000
Min/Max Units:
4.000
Total Hours:
108.000
Grading Method:
Letter grade only

Course Requirements

Prerequisite
Subject CA - Culinary Arts
Requisite Course CA 101 - Culinary Arts Orientation and Techniques (In Review)0.000 - 0.000

Course Content

Lecture
Outline
1. Introduction to Breakfast Preparation -class policies & procedures.
Approximate Time In Hours
3.00
Lecture
Outline
2. Introduction to Egg Cookery - Composition, grading, and sizing.
Approximate Time In Hours
3.00

Lecture
Outline
3. Market forms of eggs
Approximate Time In Hours
3.00
Lecture
Outline
4. Egg preparations to include poaching, frying, scrambling and omelette preparation
Approximate Time In Hours
3.00
Lecture
Outline
5. Introduction to Breakfast meats - cooking and understanding bacon, sausage and a variety of meats used on the breakfast station
Approximate Time In Hours
3.00
Lecture
Outline
6. Understanding Quick Breads and their importance on the breakfast menu
Approximate Time In Hours
3.00
Lecture
Outline
7. Lab station assignments and rotation
Approximate Time In Hours
3.00
Lecture
Outline
8. Breakfast beverages including coffee and teas
Approximate Time In Hours
3.00
Lecture
Outline
9. Dairy Products Butter and Other Fats
Approximate Time In Hours
3.00
Lecture
Outline
10. Introduction to Food Service Management
Approximate Time In Hours
3.00
Lecture
Outline
11. Motivation and Development
Approximate Time In Hours
3.00

Lecture
Outline
12. Time Management Final Exam
Approximate Time In Hours
3.00
Lab
Outline
1. Breakfast Station: Egg Cookery
Approximate Time In Hours
12.00
Lab
Outline
2. Breakfast Meat Cookery
Approximate Time In Hours
12.00
Lab
Outline
3. Breakfast Batters
Approximate Time In Hours
12.00
Lab
Outline
4. Early Childhood Nutrition
Approximate Time In Hours
12.00
Lab
Outline
5. Breakfast Pastries
Approximate Time In Hours
12.00
Lab
Outline
6. Preparation Station, prepare all items needed to keep the hot line and a la minute station in smooth running order on the egg station
Approximate Time In Hours
12.00
Lab
Outline
8. Preparation Station, prepare all items needed to keep the hot line and a la minute station in smooth running order on the sandwich station
Approximate Time In Hours
12.00
Lab
Outline
9. Preparation of classic breakfast sandwiches
Approximate Time In Hours

12.00

Course Objectives

Upon successful completion of the course, the student will demonstrate the ability to:
Lecture
Apply safety & sanitation strategies.
Lecture
Plan and prepare child care menus and nutritionally balanced government type A lunch food program.
Lecture
Discuss breakfast preparation.
Lecture
Describe the composition, grading, and sizing in relation to egg cookery.
Lecture
Describe market forms of eggs.
Lecture
Discuss Breakfast meats - cooking and understanding bacon, sausage and a variety of meats used on the breakfast station.
Lecture
Understanding Quick Breads and their importance on the breakfast menu.
Lab
Prepare eggs including poaching, frying, scrambling and omelet preparation.
Lab
Prepare breakfast meats.
Lab
Prepare breakfast batters.
Lab
Prepare breakfast pastries.
Lab
Prepare work station including all items needed to keep the hot line and a la minute station in smooth running order on the egg station.

Student Learning Outcomes

Upon completion of this course, the student should be able to:
1. 1. **Describe a la minute cookery, management applications, and cycle menu procedures.**

2. 2. **Practice and employ a la minute and cycle menu protocol in a fast-paced food service facility.**

3. 3. **Compare and contrast a la minute cooking station with batch type food preparation or pre-prepared items.**

Methods of Instruction

Demonstration
Discussion
Field trips
Guest Speakers

Internet Presentation/Resources
Laboratory
Lecture
Multimedia presentations
Role Play
Simulation

Methods of Evaluation
Problem solving demonstrations (computational or non-computational)
Skills demonstrations
Exams/Quizzes

Typical Assignments
Reading Assignments:
Required Textbooks/Content Resources

Handouts/Instructional Materials

Writing Assignments:
Read journals and magazines

Other Assignments:
Students will write and outline of immediate and future career goals. Create and write recipes and convert where appropriate.

Course Materials
Author: Sarah Labensky
Title: On Cooking
Edition: 8th
Publisher: Pearson
Year: 2022
Or Equivalent: No

Minimum Qualification
1. Culinary Arts/Food Technology
Condition

College Curriculum Committee Roster		Semester Term Began	Semester Term Ends
3-year terms			
Voting Members			
Adjunct Faculty At Large	Victoria Martinez	Fall 2023	Spring 2026
BIS Faculty Member (1)	Ahmad Manzoor	Spring 2024	Fall 2026
BIS Faculty Member (2)	Michael Vanoverbeck	Fall 2024 2nd term	Spring 2027
FACH Faculty Member (1)	Stefani Baez	Fall 2024	Spring 2027
FACH Faculty Member (2)	Susan Johnson	Spring 2023	Fall 2025
HPS Faculty Member (1)	Arneshia Bryant-Horn	Fall 2023	Spring 2026
HPS Faculty Member (2)	Shay Brown	Spring 2024 2nd term	Fall 2026
STEM Faculty Member (1)	Jose Martinez	Spring 2024	Fall 2026
STEM Faculty Member (2)	Vacant		
Social Sciences (1)	Kendahl Radcliffe	Fall 2023	Spring 2026
Social Sciences (2)	Nathan Lopez	Fall 2024 2nd term	Spring 2027
Dean	Paul Flor	Spring 2021 (extended term)	Spring 2025
Division Chair	David McPatchell	Fall 2022	Spring 2025
Faculty Counselor (1)	Noemi Monterroso	Fall 2024	Spring 2027
Student Learning Outcomes Coordinator	Jesse Mills	Spring 2024	TBD
Distance Education Faculty Coordinator	Bradfield Conn	Fall 2022	TBD
Full-time Librarian (FACH)	Lynn Chung	Fall 2023	Spring 2026
Non-Voting Members			
Articulation Officer	Melain McIntosh	N/A	
Vice President of Academic Affairs/CIO	Sheri Berger	N/A	
Curriculum Analyst	Maya Medina	N/A	
Student Representative	Shante Mumford	Spring 2024	
Academic Senate Secretary	Noemi Monterosso		
Tie-Breaking Vote Only			
College Curriculum Committee Chair	Charles Hobbs	Fall 2024	Spring 2026

Curriculum Committee Meeting Schedule

Curriculum Committee Meeting Schedule 2024-2025		
Date	Time	Location—In Person
~~1. Sept 10, 2024~~	~~2:00 p.m. 3:30 p.m.~~	~~VT-124~~
~~2. Sept 24, 2024~~	~~2:00 p.m. 3:30 p.m.~~	~~VT-124~~
~~3. Oct 8, 2024~~	~~2:00 p.m. 3:30 p.m.~~	~~VT-124~~
~~4. Oct 22, 2024~~	~~2:00 p.m. 3:30 p.m.~~	~~VT-124~~
~~5. Nov 12, 2024~~	~~2:00 p.m. 3:30 p.m.~~	~~VT-124~~
~~6. Nov 26,2024~~	~~2:00 p.m. 3:30 p.m.~~	~~VT-124~~
~~7. Dec 10, 2024~~	~~2:00 p.m. 3:30 p.m.~~	~~VT-124~~
~~8. Feb 25, 2025~~	~~2:00 p.m. – 3:30 p.m.~~	~~VT-124~~
~~9. Mar 11, 2025~~	~~2:00 p.m. 3:30 p.m.~~	~~VT-124~~
~~10. Mar 25, 2025~~	~~2:00 p.m. 3:30 p.m.~~	~~VT-124~~
~~11. Apr 8, 2025~~	~~2:00 p.m. – 3:30 p.m.~~	~~VT-124~~
~~12. Apr 22, 2025~~	~~2:00 p.m. 3:30 p.m.~~	~~VT-124~~
~~13. May 13, 2025~~	~~2:00 p.m. 3:30 p.m.~~	~~VT-124~~
14. May 27, 2025	2:00 p.m. – 3:30 p.m.	VT-124
15. Jun 10, 2025	2:00 p.m. – 3:30 p.m.	VT-124