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For the CTC:

 03/24/21

Director Date

For the College:

 3/25/21

Kristy A. Bishop, Ph.D. Date
Vice-President of Academic Affairs

Appendix I
Articulated Courses

Guide for Local Articulation

Curriculum Guide for the articulation of Machine Tool Technology/Machinist college
coursework and credit between WCCC and ICTC

WCCC

MTT 101 Blueprints (4 cr.)

CNC 111 Computer Numerical Control (4 cr.)

MTT 111 Machining I (4 cr.)

MTT 112 Machining II (4 cr.)

MTT 213 Machining III (4 cr.)

ICTC

CIP 48.0501



COURSE OUTLINE

Course Information

- A. Course Title: **Blueprints**
- B. Course Number: **MTT 101**
- C. Lecture, Lab and Credit Breakdown: **3-2-4**
- D. Course Prerequisite(s): **None**
- E. Course Co-requisite(s): **None**

Catalog Description

This course will introduce students to the basic principles, terminology, and symbology used on machining blueprints. The course will include instruction in both conventional dimensioning and geometric dimensioning and tolerancing. Machining prints will be examined and interpreted.

Learning Objectives

The purpose of this course is to:

- Explain the layout and drafting principles related to blueprints.
- Interpret the symbols and terminology of conventional prints.
- Interpret the symbols and terminology of GF&T prints.
- Apply the information on prints to the production of parts.

Course Outcomes

Upon successfully completing this course, students will be able to:

- Produce three view drawings of a part
- Explain line types, dimensions, and notes
- Interpret typical information on drawings
- Explain hole and thread specifications
- Describe contour and sectional data
- Interpret angle and detail information
- Explain standard welding symbols
- List the basic principles of GD&T
- Explain datums and how they are selected
- Describe the requirements of datum targets
- List and explain form characteristics
- List and explain orientation characteristics
- List and explain profile characteristics
- List and explain position characteristics
- List and explain runout characteristics

Topical Course Outline

1. Drawings, prints, and shapes
2. Lines, dimensions, and notes
3. Working drawings
4. Holes and threads
5. Contours and sections
6. Angles and details
7. Welding symbols
8. GD&T basics
9. Datum features
10. Datum concepts
11. Form
12. Orientation
13. Profile
14. Position
15. Runout

References, Resources, and Learning Materials Text:

Machine Trades Print Reading – Barsamin & Gizelbach

Geometric Dimensioning and Tolerancing - Madsen & Madsen

Reviewed and Approved by:

Division Dean

Date



COURSE OUTLINE

Course Information

- A. Course Title: **Computer Numerical Control I**
- B. Course Number: **CNC 111**
- C. Lecture, Lab and Credit Breakdown: **1-6-4**
- D. Course Prerequisite(s): **None**
- E. Course Co-requisite(s): **MTH 108**

Catalog Description

This course will introduce students to Computer Numerical Control of machining equipment. Students will be taught manual parts programming using the industrial standard G-code format. Students will operate CNC mills and lathes and create parts using their programs.

Learning Objectives

The purpose of this course is to:

- Explain the G codes and M codes used in CNC programming.
- Write CNC machine code using standard G-code formatting.
- Safely start-up and operate CNC mills and lathes.
- Correctly set up tooling and produce accurate parts.

Course Outcomes

Upon successfully completing this course, students will be able to:

- Locate points in the machining coordinate system (Computation 1).
- Safely start-up a CNC mill and lathe (Technology 4)
- Write absolute and incremental program code (Computation 3)
- Manually position CNC equipment (Technology 4)
- Write programs using G and M codes (Technology 4)
- Zero the machine and pickup tools (Technology 4)
- Encode linear and circular moves (Computation 3)
- Load and graph programs (Technology 5)
- Write starting and ending sequences (Technology 4)
- Calculate machine and tool offsets (Computation 3)
- Troubleshoot and correct coding errors (Critical Thinking 2)
- Incorporate canned cycles into coding (Technology 4)
- Safely execute G-code programs (Technology 4)
- Utilize subroutines and subprograms (Technology 4)

Topical Course Outline

1. CNC coordinate axes
2. Machine start up procedures
3. Absolute and increment moves

4. Manual CNC moves
5. G codes and M codes
6. Zero and tool pickups
7. Linear and circular moves
8. Loading and graphing programs
9. Start and end sequences
10. Verifying CNC programs
11. Machine and tool offsets
12. Troubleshooting programs
13. Machine canned cycles
14. Executing CNC programs
15. Subroutines and subprograms

References, Resources, and Learning Materials Text:
CNC Programming Student Workbook for Mill & Lathe

Reviewed and Approved by:

Division Dean

Date



COURSE OUTLINE

Course Information

- A. Course Title: **Machining I**
- B. Course Number: **MTT 111**
- C. Lecture, Lab and Credit Breakdown: **1-6-4**
- D. Course Prerequisite(s): **None**
- E. Course Co-requisite(s): **MTH 108**

Catalog Description

This course will introduce students to manual shop machining. Topics will include safety, measurement, benchwork, layout, hand tools, cutoff machines, offhand grinding, holmaking, workholding, drill press, mills, lathes, grinders, and feeds and speeds.

Learning Objectives

The purpose of this course is to:

- Properly identify machine tools in the lab
- Practice safe methods of machining
- Create steps in part production
- Select and properly use production hand tool

Course Outcomes

Upon successfully completing this course, students will be able to:

- Read rules, calipers, and basic gages (Technology 4)
- Read micrometers, dial gages, and digital gages (Technology 4)
- Transfer print measurements to a layout (Technology 4)
- Use band saws and abrasive cutters (Technology 4)
- Use grinding wheels and belts (Technology 4)
- Drill, thread, tap, and ream (Technology 4)
- Operate a drill press (Technology 4)
- Employ workholding devices (Technology 4)
- Operate a basic mill (Technology 4)
- Operate a basic lathe (Technology 4)
- Operate a precision grinder (Technology 4)

Topical Course Outline

1. Introduction to Machining
2. Machine Shop Safety
3. Semi-precision Measurement
4. Precision Measurement
5. Job Planning

6. Part Layout
7. Hand Tools
8. Saws and Cutoffs
9. Hand Grinders
10. Holmaking
11. Drill Press
12. Workholding
13. Mills
14. Lathes
15. Precision Grinders

References, Resources, and Learning Materials Text:
NO TEXTBOOK REQUIRED

Reviewed and Approved by:

Division Dean

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COURSE OUTLINE

Course Information

- A. Course Title: **Machining II**
- B. Course Number: **MTT 112**
- C. Lecture, Lab and Credit Breakdown: **1-6-4**
- D. Course Prerequisite(s): **MTT 111**
- E. Course Co-requisite(s): **MTH 109**

Catalog Description

This course will introduce students to basic milling, lathe, and grinding operations. Topics include machine parts, machine operations, toolholding, holmaking, chucks, cutting tools

Learning Objectives

The purpose of this course is to:

- Manufacture simple parts from prints using shop equipment
- Perform basic operations on mills including facing, contouring, and hole-making
- Perform basic operations on lathes including facing, turning, and threading
- Perform basic operations on grinders including roughing, finishing, and sizing

Course Outcomes

Upon successfully completing this course, students will be able to:

- Practice safe methods of machining (Interpersonal 3)
- Select appropriate tool holders (Critical Thinking 2)
- Secure parts for machining (Technology 4)
- Align machines and parts (Technology 4)
- Calculate speeds and feeds (Computation 3)
- Select appropriate endmills (Technology 4)
- Surface materials to size (Technology 4)
- Contour materials to size (Technology 4)
- Create holes and threads (Technology 4)
- Select or create tooling (Critical Thinking 2)
- Face materials to size (Technology 4)
- Turn materials to size (Technology 4)
- Select correct grinding wheels (Critical Thinking 2)
- Dress the wheel for grinding (Technology 4)
- Grind parts to correct size (Technology 4)

Topical Course Outline

1. Machine safety

2. Toolholding
3. Workholding
4. Alignment
5. Speeds and Feeds
6. Mill: Endmills
7. Mill: Facing
8. Mill: Contour
9. Mill: Hole-making
10. Lathe: Tooling
11. Lathe: Facing
12. Lathe: Turning
13. Grinder: Wheels
14. Grinder: Dressing
15. Grinder: Grinding

References, Resources, and Learning Materials Text:
NO TEXTBOOK REQUIRED

Reviewed and Approved by:

Division Dean

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COURSE OUTLINE

Course Information

- A. Course Title: **Machining III**
- B. Course Number: **MTT 213**
- C. Lecture, Lab and Credit Breakdown: **1-6-4**
- D. Course Prerequisite(s): **MTT 112**
- E. Course Co-requisite(s): **None**

Catalog Description

This course will introduce students to basic milling, lathe, and grinding operations. Topics include machine parts, machine operations, toolholding, holmaking, chucks, cutting tools, facing, turning, knurling, threading, endmills, cutters, abrasives, and surface grinding.

Learning Objectives

The purpose of this course is to:

- Manufacture simple parts from prints using shop equipment.
- Perform basic operations on mills including facing, contouring, and hole-making.
- Perform basic operations on lathes including facing, turning, and threading.
- Perform basic operations on grinders including roughing, finishing, and sizing.

Course Outcomes

Upon successfully completing this course, students will be able to:

- Mill horizontal and vertical angles (Technology 4)
- Mill chamfers, slots, arcs, and slits (Technology 4)
- Mill pockets for size and depth (Technology 4)
- Mill inside and outside radii (Technology 4)
- Mill equally angular surfaces (Technology 4)
- Finish surfaces of turned parts (Technology 4)
- Drill and tap holes on a lathe (Technology 4)
- Cut internal and external threads (Technology 4)
- Cut forms, grooves, and knurl (Technology 4)
- Cut taper angles on parts (Technology 4)
- Grind parallel surfaces (Technology 4)
- Grind perpendicular surfaces (Technology 4)
- Grind angular surfaces (Technology 4)
- Grind cylindrical objects (Technology 4)
- Operate an EDM machine (Technology 4)

Topical Course Outline

1. Machine safety

2. Toolholding
3. Workholding
4. Alignment
5. Speeds and feeds
6. Mill: Endmills
7. Mill: Facing
8. Mill: Contour
9. Mill: Holemaking
10. Lathe: Tooling
11. Lathe: Facing
12. Lathe: Turning
13. Grinder: Wheels
14. Grinder: Dressing
15. Grinder: Grinding

References, Resources, and Learning Materials Text:
NO TEXTBOOK REQUIRED

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