

# Industrial Technology Mississippi Curriculum Framework

**Program CIP: 15.0612- Postsecondary Industrial Technology/ Technician  
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The Office of Curriculum and Instruction (OCI) was founded in 2013 under the Division of Workforce, Career, and Technical Education at the Mississippi Community College Board (MCCB). The office is funded through a partnership with The Mississippi Department of Education (MDE), who serves as Mississippi's fiscal agent for state and federal Career and Technical Education (CTE) Funds. The OCI is tasked with developing statewide CTE curriculum, programming, and professional development designed to meet the local and statewide economic demand.

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## RESEARCH ABSTRACT

In the fall of 2020, the Office of Curriculum and Instruction (OCI) met with different industry members who made up the advisory committees for the Industrial Technology program. An industry questionnaire was used to gather feedback concerning the trends and needs, both current and future, of their field. Program faculty, administrators, and industry members were consulted regarding industry workforce needs and trends.

Industry advisory team members from colleges involved with this program were asked to give input related to changes to be made to the curriculum framework. Program faculty, administrators, and industry members were consulted regarding workforce needs and trends.

### **Revision History:**

2014, Revised, Office of Curriculum and Instruction, Mississippi Community College Board

2020, Revised, Office of Curriculum and Instruction, Mississippi Community College Board

# ADOPTION OF NATIONAL CERTIFICATION STANDARDS

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# INDUSTRY JOB PROJECTION DATA

The Industrial Technology (CIP: 15.0612) require Associate Degree. There is expected to be 4.71% increase at the state level. Median annual income for this occupation is \$44,012.80 at the state level. A summary of occupational data from the State Workforce Investment Board Data Center is displayed below:

**Table 1: Education Level**

Program Occupations	Education Level
Industrial Engineering Technicians	Associate Degree

**Table 2: Occupational Overview**

	Region	State	United States
2018 Occupational Jobs	467	467	66,804
2028 Occupational Jobs	489	489	66,163
Total Change	22	22	-641
Total % Change	4.71%	4.71%	-0.96%
2018 Median Hourly Earnings	\$21.16	\$21.16	\$26.66
2018 Median Annual Earnings	\$44,012.80	\$44,012.80	\$55,452.80
Annual Openings	2	2	-64

**Table 3: Occupational Breakdown**

Description	2018 Jobs	2028 Jobs	Annual Openings	2018 Hourly Earnings	2018 Annual Earnings 2,080 Work Hours
Industrial Engineering Technicians	467	489	2	\$21.16	\$44,012.80

**Table 4: Occupational Change**

Description	Regional Change	Regional % Change	State % Change	National % Change
Industrial Engineering Technicians	22	4.71%	4.71%	-0.96%

## ARTICULATION

No articulated credit will be offered upon implementation of this curriculum. Local agreements and dual credit partnerships are encouraged.

## TECHNICAL SKILLS ASSESSMENT

Colleges should report the following for students who complete the program with a career certificate, technical certificate, or an Associate of Applied Science Degrees for technical skills attainment. To use the approved Alternate Assessment for the following programs of study, colleges should provide a Letter of Notification to the Director of Career Technical Education at the MS Community College Board. Please see the following link for further instructions: <http://www.mccb.edu/wkfEdu/CTDefault.aspx>.

CIP Code	Program of Study	
15.0612	Industrial Technology	
Level	Standard Assessment	Alternate Assessment
Accelerated /15 Hour		
Level	Standard Assessment	Alternate Assessment
Career	Autodesk AutoCAD Certified User Exam	
Level	Standard Assessment	Alternate Assessment
Technical/AAS		

## ONLINE AND BLENDED LEARNING OPPORTUNITIES

Course content includes lecture and laboratory semester credit hours. Faculty members are encouraged to present lecture related content to students in an online or blended learning environment. Training related to online and blended learning will be available to faculty members through the MS Community College Board.

## CREDIT BY EXAMINATION

The following certification standards are aligned to courses listed below. Each test will serve as the state recommended exam to reward credit for prior learning experiences. Colleges have the local autonomy to create a college-level exam when awarding credit.

Course Number and Name	National Credential
ENT 1313 Principles of CAD	Autodesk AutoCAD Certified User Exam (with in the past 3 years)



## PROGRAM DESCRIPTION

The Industrial Technology program is designed for students who want to prepare for employment leading to supervisor, administrative, and other management positions in the production areas of industry or into industrial distribution, wholesale level sales, distribution and/or installation of industrial products and equipment.

Upon successful completion of the curriculum, the graduate may earn an Accelerated Integrated Career Pathway/15 hour Certificate, Career Certificate, Technical Certificate or an Associate of Applied Science Degree (AAS) in Industrial Technology. The curriculum also has the option of transfer to a four-year university, Mississippi State University, offering a related course of study from the College of Education, thereby leading to a Bachelor of Science Degree (BS) in Industrial Technology. Students will also be prepared to complete the Autodesk AutoCAD Certified User Exam.

## SUGGESTED COURSE SEQUENCE

### Accelerated Integrated Career Pathway/15 hour Certificate

			SCH Breakdown			Credit Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Credit Hours	Lecture	Lab	Certification Name
ENT 1113	Graphic Communications	3	2	2	60			
ENT 1154	Basic Applications of Industrial Safety	4	2	2	60			
ENT 1313	Principles of CAD	3	2	2	60			
	Electives approved by instructor per local community college policy	5						
<b>TOTAL</b>		<b>15</b>						

### Career Certificate Required Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
ENT 1113	Graphic Communications	3	2	2	60			Autodesk AutoCAD Certified User Exam
ENT 1154	Basic Applications of Industrial Safety	4	2	4	90			
ENT 1223	Industrial Power Tools Application *	3	2	2	60			
ENT 1313	Principles of CAD	3	2	2	60			
ENT 1533	Blueprint Reading	3	2	2	60			
ENT 1813	Basic Electricity and Electronics***	3	2	2	60			
ENT 2323	Industrial Welding and Metals **	3	2	2	60			
ENT 2343	Advanced CAD	3	2	2	60			
ENT 2363	Computer Numerical Control Drafting	3	2	2	60			
ENT 2613	Program Logic Controllers****	3	2	2	60			
<b>TOTAL</b>		<b>30</b>						

\*IMM 1224 Power Tools Application may substitute for ENT 1223 Industrial Power Tools Application

\*\*IMM 1734 Maintenance Welding and Metals may substitute for ENT 2323 Industrial Welding and Metals

\*\*\*IMM 1814 Industrial Electricity Level I may substitute for ENT 1813 Basic Electricity and Electronics

\*\*\*\*IMM 2613 Programmable Logic Controls may substitute for ENT 2613 Program Logic Control

### Technical Certificate Required Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
ENT 1183	Spreadsheet Applications	3	2	2	60			
ENT 2243	Cost Estimating	3	2	2	60			
ENT 2443	Intermediate Design	3	2	2	60			
	Electives approved by instructor per local community college policy	6						
	<b>TOTAL</b>	<b>15</b>						

### Approved Program Electives

			SCH Breakdown			Credit Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Credit Hours	Lect ure	Lab	Certification Name
SSP 100(2-3)	Smart Start 101	2-3						
ENT 1123	Computational Methods for Drafting	3	2	2	60			
ENT 1213	Materials	3	2	2	60			
ENT 2263	Quality Assurance	3	2	2	60			
ENT 2523	Intermediate Design	3	1	4	75			
ENT 2723	Digital Studio	3	2	2	60			
ENT 291(1-3)	Special Projects	1-3		2-6	30-90			
WBL 191(1-3) WBL 192(1-3) WBL 193(1-3) WBL 291(1-3) WBL 292(1-3) WBL 293(1-3)	Work-Based Learning	1-3						
	Other electives approved by instructor per local community college policy							
<b>TOTAL</b>								

## Course Listing

			SCH Breakdown			Program Certifications
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	
ENT 1113	Graphic Communications	3	2	2	60	
ENT 1123	Computational Methods for Drafting	3	2	2	60	
ENT 1154	Basic Applications of Industrial Safety	4	2	4	90	
ENT 1183	Spreadsheet Applications	3	2	2	60	
ENT 1213	Materials	3	2	2	60	
ENT 1223	Industrial Power Tools Application*	3	2	2	60	
ENT 1313	Principles of CAD	3	2	2	60	
ENT 1533	Blueprint Reading	3	2	2	60	
ENT 1813	Basic Electricity and Electronics***	3	2	2	60	
ENT 2243	Cost Estimating	3	2	2	60	
ENT 2263	Quality Assurance	3	2	2	90	
ENT 2323	Industrial Welding and Metals*	3	2	2	60	
ENT 2343	Advanced CAD	3	2	2	60	
ENT 2363	Computer Numerical Control Drafting	3	2	2	60	
ENT 2443	Principles of Manufacturing Management	3	2	2	60	
ENT 2523	Intermediate Design	3	1	4	75	
ENT 2613	Program Logic Controllers****	3	2	2	60	
ENT 2723	Digital Studio	3	2	2	60	
ENT 291(1-3)	Special Projects	1-3		2-6	30-90	
	Electives approved by instructor per local community college policy					

## General Education Core Courses

To receive the Associate of Applied Science degree, a student must complete all of the required coursework found in the Career Certificate option, Technical certificate option, and a minimum of 15 semester hours of General Education core. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester or

provided primarily within the last semester. Each community college will specify the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science degree at their college. The Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) Section 9 Standard 3 of the *Principles of Accreditation: Foundations for Quality Enhancement*<sup>3</sup> describes the general education core.

#### Section 9 Standard 3:

3. The institution requires the successful completion of a general education component at the undergraduate level that
  - a) is based on a coherent rationale.
  - b) is a substantial component of each undergraduate degree program. For degree completion in associate programs, the component constitutes a minimum of 15 semester hours of the equivalent; for baccalaureate programs, a minimum of 30 semester hours or the equivalent.
  - c) ensures breadth of knowledge. These credit hours include at least one course from each of the following areas: humanities/fine arts, social/behavioral sciences, and natural science/mathematics. These courses do not narrowly focus on those skills, techniques, and procedures specific to a particular occupation or profession.

#### General Education Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
	Humanities/Fine Arts	3						
	Social/Behavioral Sciences	3						
	Math/Science	3						
	Academic electives	6						
	<b>TOTAL</b>	<b>15</b>						

## COURSE DESCRIPTIONS

Course Number and Name:            **ENT 1113**            **Graphic Communications**

<sup>3</sup> Southern Association of Colleges and Schools Commission on Colleges. (2017). *The Principles of Accreditation: Foundations for Quality Enhancement*. Retrieved from <http://www.sacscoc.org/2017ProposedPrinc/Proposed%20Principles%20Adopted%20by%20BOT.pdf>

**Description:** This course is designed to give student fundamentals and principles of drafting to provide the basic background needed for all other engineering technology courses.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	60

**Prerequisite:** Instructor Approved

**Student Learning Outcomes:**

1. Discuss classroom procedures and drafting occupations
  - a. Describe proper classroom/lab procedures
  - b. Describe the various occupations in drafting and their requirements
2. Explain and apply safety rules and regulations
  - a. Describe safety rules for drafting occupations
  - b. List and discuss hazardous materials found in the drafting area
3. Apply proper techniques in technical drawings <sup>4b, 6b, 9a</sup>
  - a. Demonstrate the ability to scale drawings
  - b. Construct various angles
  - c. Recognize and construct the alphabet of lines
4. Sketch and develop views of basic shapes <sup>2a-c, 3a-c, 4a-c, 5a-c, 6a-c, 8a-b, 9a, 10a-c</sup>
  - a. Develop a pictorial view from three principal views
  - b. Develop three principal views from a pictorial view
  - c. Complete three principal views when lines are missing
5. Use geometric constructions <sup>2a-c, 4a-c, 5a-c, 6a-c, 8a-b, 9a, 10a-c</sup>
  - a. Construct tangent arcs and lines
  - b. Divide lines or arcs into equal and/or proportional parts
  - c. Develop geometric shapes
6. Construct orthographic projections <sup>1-10</sup>
  - a. Construct a top view, with front and right side views given
  - b. Construct a front view, with top and right side views given
  - c. Construct a right side view, with top and front views given
  - d. Develop a drawing consisting of three principal views
7. Dimension objects <sup>8a, 8b</sup>
  - a. Recognize lines, symbols, features, and conventions used in dimensioning
  - b. Recognize and use size and location dimensions
  - c. Recognize and use general and local notes
  - d. Dimension a drawing using contour, chain, and baseline dimensioning
8. Construct sectional views <sup>1-10</sup>
  - a. Construct full and half sectional views
  - b. Recognize and construct removed, revolved, offset, and aligned sectional views

## **Autodesk Certified User Certification**

1. APPLY BASIC DRAWING SKILLS
  - a Create selection sets
  - b Use coordinate systems
2. DRAW OBJECTS
  - a Draw lines and rectangles
  - b Draw circles, arcs, and polygons
  - c Draw polylines
3. DRAW WITH ACCURACY
  - a Work with grid and snap
  - b Use object-snap tracking
  - c Use coordinate systems
4. MODIFY OBJECTS
  - a Move and copy objects
  - b Rotate and scale objects
  - c Create and use arrays
  - d Trim and extend objects
  - e Offset objects
  - f Mirror objects
  - g Use grip editing
  - h Fillet and chamfer objects
5. USE ADDITIONAL DRAWING TECHNIQUES
  - a Use coordinate systems
  - b Draw and edit polylines
  - c Apply hatches and gradients
6. ORGANIZE OBJECTS
  - a Change object properties
  - b Alter layer assignments for objects
  - c Control layer visibility
7. REUSE EXISTING CONTENT
  - a Insert blocks
8. ANNOTATE DRAWINGS
  - a Add and modify text
  - b Use dimensions
9. LAYOUTS AND PRINTING
  - a Set printing and plotting options
10. APPLY BASIC DRAWING SKILLS
  - a Create selection sets
  - b Use coordinate systems
  - c Use dynamic input, direct distance, and shortcut menus
  - d Use inquiry commands



## Computational Methods for Drafting

**Description:**

This course is designed to give the student a study of computational skills required for the development of accurate design and drafting methods.

### Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	60

**Prerequisite:**

Instructor Approved

**Student Learning Outcomes:**

1. Demonstrate various measurement methods
  - a. Measure distances, including metric and English measurements
  - b. Measure angles, including decimal degrees and degrees, minutes, and seconds
2. Apply industry data
  - a. Interpret graphs and charts
  - b. Manipulate gathered information
3. Analyze complex geometric shapes 2a-c, 4a-h, 5b, 6b, 8a&b, 9a, 10b-d
  - a. Solve basic algebraic equations and conversions from fraction to decimal and metric
  - b. Calculate volume using metric and English systems
  - c. Solve geometric construction based on area/volume solutions
  - d. Calculate area using metric and English systems
4. Calculate trigonometric values
  - a. Calculate angle values of a triangle
  - b. Solve geometric construction based on angular solutions

## Autodesk Certified User Certification

2. DRAW OBJECTS
  - a Draw lines and rectangles
  - b Draw circles, arcs, and polygons
  - c Draw polylines
  
4. MODIFY OBJECTS
  - a Move and copy objects
  - b Rotate and scale objects
  - c Create and use arrays
  - d Trim and extend objects
  - e Offset objects
  - f Mirror objects
  - g Use grip editing
  - h Fillet and chamfer objects
  
5. USE ADDITIONAL DRAWING TECHNIQUES
  - b Draw and edit polylines

6. ORGANIZE OBJECTS
  - b Alter layer assignments for objects
8. ANNOTATE DRAWINGS
  - a Add and modify text
  - b Use dimensions
9. LAYOUTS AND PRINTING
  - a Set printing and plotting options
10. APPLY BASIC DRAWING SKILLS
  - b Use coordinate systems
  - c Use dynamic input, direct distance, and shortcut menus
  - d Use inquiry commands

**Course Number and Name:**            **ENT 1154     Basic Applications of Industrial Safety**

**Description:**                                This course introduces the concepts of health and safety in engineering technology related fields. It aims to make the students safety conscious in relation to personal safety, accident prevention, and methods of compliance.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
4	2	4	90

**Prerequisite:**                                Instructor Approved

**Student Learning Outcomes:**

1.     Identify basic safety and related laws
  - a.     Study various types of accidents
  - b.     Identify rights and responsibilities of employees and employers
  - c.     Learn concepts about OSHA and EPA regulations
2.     Review and describe the human element.
  - a.     Introduction to specific job Personal Protection Equipment (PPE)
  - b.     Study of ergonomics
3.     Identify hazard assessment, prevention, and control
  - a.     Introduction to chemical safety
  - b.     Introduction to tool safety
  - c.     Introduction to machine safety
  - d.     Introduction to electrical safety
  - e.     Introduction to safe materials handling
4.     Identify management of safety and health
  - a.     Introduction to electrical protection
  - b.     Introduction to basic fire protection
  - c.     Introduction to personal health protection
5.     Interpret basic safe work practices

**Course Number and Name:**

**ENT 1183**

**Spreadsheet Applications**

**Description:**

This course focuses on applications of the electronic spreadsheet as an aid to management decision making.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	60

**Prerequisite:**

Instructor Approved

**Student Learning Outcomes:**

1. Demonstrate electronic spreadsheet applications
  - a. Define terminology related to spreadsheet applications
  - b. Design and format effective spreadsheets
    - (1) Enter, edit, insert, delete, and move cell data
    - (2) Find and replace cell data and formats
    - (3) Apply and modify cell formats and row and column settings
    - (4) Use automated tools in formatting
    - (5) Use spell-check
  - c. Create and revise formulas, using functions as well as relative and 3-D references
  - d. Create, modify, position, print, and interpret charts and graphs
  - e. Utilize the database functions of electronic spreadsheet software, including filtering, subtotals, and sorting using multiple fields
  - f. Manage and customize spreadsheet files and folders
    - (1) Create spreadsheets using templates, and save using different names and file formats
    - (2) Insert and delete worksheets in a workbook, and modify worksheet names and positions
    - (3) View and edit comments
    - (4) Protect spreadsheets and spreadsheet elements
  - g. Link and export data to word processing documents, presentations, and CAD drawings

**Course Number and Name:**

**ENT 1213**

## Materials

**Description:**

This course is designed to teach students physical properties of the materials generally used in the erection of a structure and the manufacture of products, with a brief description of their manufacture

### Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	60

**Prerequisite:**

Instructor Approved

**Student Learning Outcomes:**

1. Describe the uses of wood components
  - a. Identify and describe diseases and lumber defects
  - b. Identify different types of lumber and their design factors
  - c. Identify and describe plywood and panel products and their design factors
  - d. Identify and describe products manufactured from wood and their design factors
  - e. Identify and describe heavy timbers and their design factors
  - f. Identify fire retardant treatments
2. Describe concrete characteristics
  - a. Describe the use of common and special types of concrete
  - b. Classify aggregates
  - c. Explain how the design and control of concrete is maintained
  - d. Describe the psi rating system for concrete
  - e. Review and describe the design applications of admixtures
  - f. Identify and explain typical concrete test applications
  - g. Identify and describe common concrete masonry units
  - h. Explain concrete batching, transportation, handling, placement, finishing, and curing
3. Describe the characteristics of ferrous metals
  - a. Describe the manufacturing processes of steel
  - b. Review and describe the design applications of ferrous metals
  - c. Identify and describe steel identification systems
  - d. Identify and describe metal testing methods
4. Describe the characteristics of nonferrous metals
  - a. Describe the manufacturing processes of aluminum and other nonferrous metals
  - b. Review and describe the design applications of nonferrous metals
  - c. Identify and describe identification systems of nonferrous metals
  - d. Identify design solutions to minimize galvanic corrosion
5. Describe the characteristics of plastics
  - a. Describe the manufacturing processes of plastics
  - b. Review and describe the design applications of admixtures
  - c. Identify and describe multiple types of plastic
6. Describe various materials used in manufacturing and construction
  - a. Identify and describe different types of protective coatings

- b. Identify and describe different types of insulating materials
- c. Identify and describe gypsum products and materials

**Course Number and Name:**        **ENT 1223**        **Industrial Power Tools Application**

**Description:**                                This course is designed to teach students the safe and proper use of various hand and stationary power tools. This course includes instruction in the use of hand power tools, bench grinders, table saws, planer, cut-off saws, and drill presses.

**Hour Breakdown:**

<b>Scheduled Hours</b>	<b>Lecture</b>	<b>Lab</b>	<b>Clock Hours</b>
3	2	2	60

**Prerequisite:**                                Instructor Approved

**Student Learning Outcomes:**

1.        Demonstrate the safe and proper use of hand power tools
  - a.    Inspect, adjust, and operate hand power drills in a safe and proper manner
  - b.    Inspect, adjust, and operate hand cut-off saws in a safe and proper manner
  - c.    Inspect, adjust, and operate side grinders in a safe and proper manner
  - d.    Inspect, adjust, and operate circular saw in a safe and proper manner
  - e.    Inspect, adjust, and operate impact wrenches in a safe and proper manner
2.        Demonstrate the safe and proper use of a bench grinder
  - a.    Inspect, set up, and adjust a bench grinder for safe and proper use
  - b.    Sharpen twist steel drill bit
  - c.    Sharpen lathe tool bits
  - d.    Grind angles on metal
3.        Demonstrate the safe and proper use of a drill press
  - a.    Inspect, set up, and adjust a drill press for safe and proper operation
  - b.    Locate and drill holes in metal to specifications
  - c.    Ream holes to specifications
4.        Demonstrate the safe and proper use of a pipe threading machine
  - a.    Inspect, set up, and adjust a pipe threading machine for safe and proper operations
  - b.    Cut pipe to length
  - c.    Thread various diameters of pipe
5.        Demonstrate the safe and proper use of a cut-off saw
  - a.    Inspect, set up, and adjust a cut-off saw for safe and proper operation
  - b.    Service a cut-off saw blade to include removal, welding, installation, and tensioning
  - c.    Cut metal to length with a cut-off saw
  - d.    Cut angles on metal with a cut-off saw

**Course Number and Name:**            **ENT 1313**            **Principles of CAD**

**Description:**                            This course will use CAD to draw various problems in engineering related areas. Emphasis will be placed on the operations of the CAD system to solve drafting problems.

<b>Hour Breakdown:</b>	<b>Scheduled Hours</b>	<b>Lecture</b>	<b>Lab</b>	<b>Clock Hours</b>
	3	2	2	60

**Prerequisite:**                            Instructor Approved

**Student Learning Outcomes:**

1.        Manage the operating system
  - a.    Examine the contents of storage devices
  - b.    List, erase, rename, and copy files on storage devices
  - c.    Examine, create, remove, and move files between folders and subfolders
  - d.    Access information services (e.g., Internet, e-mail, and networks)
2.        Use the basic hardware of the CAD system <sup>9a</sup>
  - a.    Input data using keyboard and graphics tablet, or mouse
  - b.    Access files and/or symbols from the hard disk
  - c.    Store, retrieve, copy, and delete drawings and files
3.        Perform drafting functions on the CAD system <sup>1-10</sup>
  - a.    Construct single-view and multi-view drawings
  - b.    Modify or edit an existing drawing
  - c.    Modify the existing system variables

**Autodesk Certified User Certification**

1.        APPLY BASIC DRAWING SKILLS
  - a.    Create selection sets
  - b.    Use coordinate systems
2.        DRAW OBJECTS
  - a.    Draw lines and rectangles
  - b.    Draw circles, arcs, and polygons
  - c.    Draw polylines
3.        DRAW WITH ACCURACY
  - a.    Work with grid and snap
  - b.    Use object-snap tracking
  - c.    Use coordinate systems
4.        MODIFY OBJECTS
  - a.    Move and copy objects
  - b.    Rotate and scale objects
  - c.    Create and use arrays
  - d.    Trim and extend objects
  - e.    Offset objects
  - f.    Mirror objects



- g      Use grip editing
- h      Fillet and chamfer objects
- 5.      USE ADDITIONAL DRAWING TECHNIQUES
  - a      Use coordinate systems
  - b      Draw and edit polylines
  - c      Apply hatches and gradients
- 6.      ORGANIZE OBJECTS
  - a      Change object properties
  - b      Alter layer assignments for objects
  - c      Control layer visibility
- 7      REUSE EXISTING CONTENT
  - a      Insert blocks
- 8.      ANNOTATE DRAWINGS
  - a      Add and modify text
  - b      Use dimensions
- 9.      LAYOUTS AND PRINTING
  - a      Set printing and plotting options
- 10.     APPLY BASIC DRAWING SKILLS
  - a      Create selection sets
  - b      Use coordinate systems
  - c      Use dynamic input, direct distance, and shortcut menus
  - d      Use inquiry commands

**Course Number and Name:** ENT 1533 Blueprint Reading

**Description:** This course is designed to give the student terms and definitions used in reading blueprints. Basic sketching, drawing, and dimensioning of objects will be covered.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	60

**Prerequisite:** Instructor Approved

**Student Learning Outcomes:**

1. Use the basic drawing equipment and terms used in sketching and making drawings<sup>2a-c, 3a-c, 4d g&h, 5c, 6a-c, 8a-b, 10c</sup>
  - a. Identify terms, symbols, and lines used in blueprints
  - b. Utilize the basic equipment for sketching and/or drawing
2. Interpret blueprints
  - a. Identify the three basic views of a drawing
  - b. Identify the various lines used on drawings
  - c. Interpret dimensions and symbols
  - d. Interpret general and specific notes on drawings
  - e. Locate features on drawings

**Autodesk Certified User Certification**

2. DRAW OBJECTS
  - a. Draw lines and rectangles
  - b. Draw circles, arcs, and polygons
  - c. Draw polylines
3. DRAW WITH ACCURACY
  - a. Work with grid and snap
  - b. Use object-snap tracking
  - c. Use coordinate systems
4. MODIFY OBJECTS
  - d. Trim and extend objects
  - g. Use grip editing
  - h. Fillet and chamfer objects
5. USE ADDITIONAL DRAWING TECHNIQUES
  - c. Apply hatches and gradients
6. ORGANIZE OBJECTS
  - a. Change object properties
  - b. Alter layer assignments for objects
  - c. Control layer visibility
8. ANNOTATE DRAWINGS
  - a. Add and modify text
  - b. Use dimensions

10. APPLY BASIC DRAWING SKILLS
  - c Use dynamic input, direct distance, and shortcut menus

**Course Number and Name:**

**ENT 1813**

## Basic Electricity and Electronics

**Description:**

This course is designed to give the student instruction in terminology and basic principles of electricity, use of test equipment, safety practices for working around and with electricity, and basic electrical procedures.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	60

**Prerequisite:**

Instructor Approved

**Student Learning Outcomes:**

1. Discuss and apply proper safety procedures for industrial and electrical electronics
  - a. Define terms related to electrical lockout/tagout applications
  - b. Determine correct application of lockout/tagout on electrical enclosures, panels, and switching devices
  - c. Discuss terms related to shop and tool safety
  - d. Discuss terms related to AC safety and protection devices
2. Apply basic terminology and principles associated with electricity
  - a. Define terms related to electrical applications
  - b. Practice safety precautions and procedures associated with electricity
  - c. Identify and describe the use of fuses, ground-fault interrupters, breakers, and other safety devices associated with electrical circuits
  - d. Apply Ohm's law to calculate circuit parameters including voltage, current, resistance, and power
  - e. Discuss the effect of wire size on current and voltage in a circuit
3. Develop the basic skills to analyze and construct electronic circuits
  - a. Define and use symbols, abbreviations, and terminology found in industrial electrical work
  - b. Calculate amperage for a given circuit
  - c. Identify basic series, parallel, and series parallel circuits
4. Develop competencies in basic electronic fundamentals to problem solving techniques
  - a. Measure current, voltage, and resistance in a circuit
  - b. Test a circuit for continuity
  - c. Perform tag out, disconnect, and reconnect an electric motor
  - d. Perform preventive maintenance on an electric motor (disassemble, clean and inspect, lubricate, and reassemble)

**Course Number and Name:**

**ENT 2243**

**Cost Estimating**

**Description:**

This course is designed to give the student preparation of material and labor quantity surveys from actual working drawings and specifications.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	60

**Prerequisite:**

Instructor Approved

**Student Learning Outcomes:**

1. Prepare a cost estimate of an assigned building <sup>8b, 9a, 10d</sup>
  - a. Define the different types of estimates and specific purposes of each
  - b. Prepare estimates of various kinds of foundations
  - c. Estimate wall, ceiling, and roof frames
  - d. Estimate exterior and interior finishes
  - e. Estimate sub-contract items
2. Discuss the best construction methods based on project requirements
  - a. List the different types of construction in residential and commercial buildings
  - b. Discuss the best method of construction in residential and commercial buildings
3. Complete a materials list for a structure
  - a. Describe the procedures of doing a materials list
  - b. Explain the purposes for a materials list
  - c. Complete a materials form for a construction project

**Autodesk Certified User Certification**

8. ANNOTATE DRAWINGS
  - b. Use dimensions
9. LAYOUTS AND PRINTING
  - a. Set printing and plotting options
10. APPLY BASIC DRAWING SKILLS
  - d. Use inquiry commands

**Course Number and Name:** ENT 2263 **Quality Assurance**

**Description:** This course focuses on the application of statistics and probability theory in quality assurance programs. Various product sampling plans as well as the development of product charts for defective units will be studied.

### Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	60

**Prerequisite:** Instructor Approved

**Student Learning Outcomes:**

1. Utilize basic quality assurance procedures
  - a. Discuss the history, development, and current trends of quality assurance and the use of quality circles
  - b. Describe the concept of probability
  - c. Compute the following measurements of central tendency: mean, median, and mode for a given set of data
  - d. Describe the frequency distribution for a normal population
  - e. Distinguish among the terms “accuracy,” “precision,” and “accuracy and precision”
  - f. Compute the standard deviation and the square of the residuals for a given set of data
2. Effectively use sampling techniques
  - a. Describe the process of random sampling as applied to quality assurance
  - b. Compare single and multiple sampling plans
  - c. Describe the characteristics of the sampling plans
3. Effectively use various charts
  - a. Describe the general theory of a control chart
  - b. Describe the development and use of fraction defective charts
  - c. Discuss special applications of control charts
  - d. Apply quality assurance procedures in a laboratory setting







- b Use coordinate systems
- c Use dynamic input, direct distance, and shortcut menus





**Course Number and Name:**                **ENT 2523**                **Intermediate Design**

**Description:**                                        This course is designed to give the student a general overview of current issues in digital media; a study of how digital media can assist in the work environment; provides a basis for further study in graphic design and production.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	1	4	75

**Prerequisite:**                                        Instructor Approved

**Student Learning Outcomes:**

1. Discuss and apply proper safety procedures regarding preventative maintenance and service of equipment
2. Perform preventive maintenance on equipment
  - a. Develop a preventive maintenance program for a given piece of equipment
  - b. Inspect and adjust belts, chains, and other moving parts
  - c. Lubricate a machine following manufacturer's recommendations
3. Troubleshoot and repair equipment
  - a. Identify symptoms that indicate a machine is not operating properly (excessive noise, vibration, heat, speed, etc.)
  - b. Determine the cause of the symptoms
  - c. Inspect machinery for broken or worn parts, and determine if replacement is needed
  - d. Prepare a report on time and costs involved in repairing equipment, including shutdown time for the machinery
  - e. Perform lockout–tagout procedures for broken equipment
  - f. Disassemble, inspect, repair, and reassemble equipment to specifications

**Description:**

This course includes of programmable logic controllers (PLCs) in modern industrial settings. This course also includes the operating principles of PLCs and practice in the programming, installation, and maintenance of PLCs.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	60

**Prerequisite:**

Instructor Approved

**Student Learning Outcomes:**

1. Explain principles of PLCs
  - a. Identify components and operational principles of PLCs
  - b. Differentiate between a PLC and a computer
2. Identify different types of PLC hardware
  - a. Identify and wire different types of input and output modules
  - b. Identify different types of PLC processor modules, memory capabilities, and programming devices
3. Explain numbering systems, encoding/decoding, and logical operations
  - a. Convert numbers from one system to another
  - b. Explain logical operations using truth tables and ladder logic diagrams
4. Program all types of internal and discrete instructions
  - a. Program examine on and off instructions
  - b. Program on-delay and off-delay instructions
  - c. Program up-counter and down-counter instructions
  - d. Program sequencer instructions for real-world output devices
  - e. Program latch and unlatch instructions
5. Troubleshoot and maintain programmable controller systems
  - a. Identify and troubleshoot the power supply
  - b. Identify and troubleshoot the inputs and outputs (I/O) cards
  - c. Identify and troubleshoot real-world inputs and outputs

**Description:**

This course is designed to give the student a general overview of current issues in digital media; a study of how digital media can assist in the work environment; provides a basis for further study in graphic design and production.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	60

**Prerequisite:**

Instructor Approved

**Student Learning Outcomes:**

1. Produce multimedia pictures using multimedia software with a scripted presentation
  - a. Define terms associated with multimedia
  - b. Sketch a layout of a multimedia presentation
  - c. Explain the use of the software
  - d. Develop a picture using the software
  - e. Compose a script
  - f. Deliver a presentation
2. Construct computer-generated animation
  - a. Define terms associated with computer-generated animation
  - b. Identify animation software
  - c. Create an animation storyboard
  - d. Prepare and present a computer-generated animation project
3. Research and develop projects that are a culmination of training specifically related to the engineering industry
  - a. Investigate and formulate conceptual ideas for industry needs
  - b. Employ computer-generated graphics to create professional artwork to meet industry needs
  - c. Manipulate current software to generate graphics to meet industry needs
4. Create an electronic portfolio
  - a. Develop a resume
  - b. Create images of program projects
  - c. Organize in a digital format to be used for employment or transferability purposes



5. USE ADDITIONAL DRAWING TECHNIQUES
  - a Use coordinate systems
  - b Draw and edit polylines
  - c Apply hatches and gradients
6. ORGANIZE OBJECTS
  - a Change object properties
  - b Alter layer assignments for objects
  - c Control layer visibility
7. REUSE EXISTING CONTENT
  - a Insert blocks
8. ANNOTATE DRAWINGS
  - a Add and modify text
  - b Use dimensions
9. LAYOUTS AND PRINTING
  - a Set printing and plotting options
10. APPLY BASIC DRAWING SKILLS
  - a Create selection sets
  - b Use coordinate systems
  - c Use dynamic input, direct distance, and shortcut menus
  - d Use inquiry commands



**Course Number and Name:** WBL 191(1-3), WBL 192(1-3), Work-Based Learning I, II, III, IV, V, and VI  
WBL 193(1-3), WBL 291(1-3),  
WBL 292(1-3), and WBL 293(1-3)

**Description:** A structured work-site learning experience in which the student, program area teacher, Work-Based Learning Coordinator, and worksite supervisor/mentor develop and implement an educational training agreement. Designed to integrate the student's academic and technical skills into a work environment. Includes regular meetings and seminars with school personnel for supplemental instruction and progress reviews. (1-3 sch: 3-9 hours externship)

**Hour Breakdown:**

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

**Prerequisite:** Instructor approved

**Student Learning Outcomes:**

1. Apply technical skills and related academic knowledge needed to be a viable member of the workforce.
  - a. Apply technical skills needed to be a viable member of the workforce.
  - b. Apply skills developed in other related courses in a work-based setting.
  - c. Perform tasks detailed in an educational training agreement at the work setting.
2. Apply general workplace skills to include positive work habits and responsibilities necessary for successful employment.
  - a. Demonstrate pro-active human relationship skills in the work setting to include conflict resolution, team participation, leadership, negotiation, and customer/client service.
  - b. Demonstrate time, materials, and resource management skills.
  - c. Demonstrate critical thinking skills such as problem solving, decision making, and reasoning.
  - d. Demonstrate acquiring, evaluating, organizing, maintaining, interpreting, and communicating information.
  - e. Demonstrate positive work habits and acceptance of responsibilities necessary for successful employment.

# APPENDIX A: RECOMMENDED TOOLS AND EQUIPMENT

## Capitalized Items

Access to some tools and equipment may be provided by Machine Shop, Electrical, Plumbing/Pipefitting, Automotive, Welding, HVAC & Industrial Maintenance Program facilities.

1. Computer workstation with AutoCAD (or other design software) (20)
2. PLC Trainers (10) (need access to computers)
3. CNC Mills (5) (need access to computers)
4. CNC Lathes (5) (need access to computers)
5. Electronic/Electricity Trainers (10) (need access to computers)
6. 3D extrusion printer (5) (need access to computers)
7. Laser jet printer (2)
8. Scanner (1)
9. Emergency eyewash station (1)
10. Work bench with heavy duty mechanics vises (5)
11. Work area protective screens (1 per booth)
12. Exhaust system welding lab (1)
13. Vacuum system in power tools lab if applicable (1)
14. Compressed air delivery system (compressor, lines, hoses, air regulator, quick connectors, adapters) (1)
15. Compress Air Dryer (1)
16. Shielded metal arc welding machine (AC-DC) with cables and accessories (6)
17. Welding Rod Oven (1)
18. Oxy-fuel welding, brazing, and cutting equipment with regulators, hoses, torch and tips, cart, and accessories (6) (adaptable to manifold system if applicable)
19. Horizontal band saw (1)
20. Metal drill press with accessories (vise, collets, hold down clamps) (1)
21. Pedestal grinders (2)
22. Tap and die set (1)
23. Outside micrometer (10)
24. Dial caliper (10)
25. Depth micrometer (2)
26. Hand tool sets (wrenches, sockets, socket accessories, screwdrivers, hammers, punches, chisels, pliers, allen wrenches, feeler gauges, files, adjustable wrenches, etc.) (5)
27. Pipe threading machine with accessories (1)
28. Chain hoist on portable a-frame or overhead trolley (2)
29. Hoisting accessory kits (pulleys, chains, wire robe, clamps, block and tackle, come-alongs, shackles, hooks, tie-downs, etc.) (1)
30. Hydraulic jacks (2)
31. Jack stands (2)
32. Abrasive cut-off saw (1)
33. Fiberglass step ladder (3 at various heights) (1 of each)
34. Four-wheel heavy duty dolly (1)
35. Impact wrench with impact sockets (2)
36. Stationary belt sander (1)
37. Vertical band saw (1)
38. MIG welders with accessories (2)

39. Plasma cutter (1)
40. Reciprocating saw (2)
41. Hammer drill (2)
42. Radial miter saw (1)
43. Table saw (1)
44. Planer (1)

Other equipment items can be added when deemed appropriate by the community college industry craft committee or by industry/business training requirements.

#### **Non-Capitalized Items**

1. Architectural, Engineer, Decimal, Metric scales (20 per category)
2. 4.5" right angle grinder (4)
3. 9" right angle grinder (1)
4. First aid kit (1 per lab)
5. Leather jacket, sleeves, leather gloves, apron, etc. (8 sets)
6. Welding helmets (2 per machine)
7. Welding goggles (2 per oxy-fuel setup)
8. Hole saw set (3/8" – 2") (2)
9. Safety glasses with side shields, safety goggles, face shields (1 pair per student minimum)
10. Sanitizing cabinet (1)
11. Drill bit set (2)
12. Combination square set (8)
13. Bevel square (6)
14. Rafters Square (3)
15. Torpedo level (5)
16. Carpenter level (2)
17. Hand hack saw (5)
18. Cross cut and rip hand saw (4 each)
19. Cordless drill with charger (3/8") (4)
20. Pipe wrench set (6"-18") (2)
21. Electrical hand tool set (lineman's pliers, wire stripper, screwdriver, needle nose plier, nut drivers) (4)
22. Digital Volt Ohm meter (6)
23. Adjustable wrench set (2)
24. Lockout/tagout station (1)
25. Chipping hammer (8)
26. Wire brushes (10)
27. Clamp on amp meter (2)
28. Circular(skill) saw (5)
29. Jigsaw (3)
30. Pedestal Disk Sander (1)
31. Hand held belt sander (3)
32. Metal scribe (10)
33. Nail Set (4)
34. Nibbler (1)
35. Straight, right and left angle hand shears (2 of each)
36. Pliers (vise grip, adjustable, channel lock, etc.) (4 each)
37. Welding vise grips (2 per welding station)
38. Assorted angle welding magnet holders (2 per station)
39. 25' tape measure (20)

40. 100' tape measure (5)
41. Wood folding rule (10)
42. 7.5" speed square (6)
43. Nail gun (2)
44. Staple gun (1)
45. Brad gun (1)
46. Soapstone
47. Chalk Line & Chalk
48. Pipe Bender
49. Hand Pipe Cutter
50. Plumb bob (1)

Other equipment items can be added when deemed appropriate by the community college industry craft committee or by industry/business training requirements.

## RECOMMENDED INSTRUCTIONAL AIDS

It is recommended that instructors have access to the following items:

1. TV monitor (1)
2. VCR/DVD player (1)
3. AV cart (1)
4. Projection screen (1)
5. Overhead projector (1)
6. Teacher computer with printer (1)

## APPENDIX B: CURRICULUM DEFINITIONS AND TERMS

Course Name – A common name that will be used by all community colleges in reporting students

Course Abbreviation – A common abbreviation that will be used by all community and junior colleges in reporting students

Classification – Courses may be classified as the following:

- a. Career Certificate Required Course – A required course for all students completing a career certificate.
- b. Technical Certificate Required Course – A required course for all students completing a technical certificate.
- c. Technical Elective – Elective courses that are available for colleges to offer to students.

Description – A short narrative that includes the major purpose(s) of the

Prerequisites – A listing of any courses that must be taken prior to or on enrollment in the course

Corequisites – A listing of courses that may be taken while enrolled in the course

Student Learning Outcomes – A listing of the student outcomes (major concepts and performances) that will enable students to demonstrate mastery of these competencies

The following guidelines were used in developing the program(s) in this document and should be considered in compiling and revising course syllabi and daily lesson plans at the local level:

The content of the courses in this document reflects approximately 75% of the time allocated to each course. The remaining 25% of each course should be developed at the local district level and may reflect the following:

Additional competencies and objectives within the course related to topics not found in the state framework, including activities related to specific needs of industries in the community college district

Activities that develop a higher level of mastery on the existing competencies and suggested objectives

Activities and instruction related to new technologies and concepts that were not prevalent at the time the current framework was developed or revised

Activities that include integration of academic and career–technical skills and course work, school-to-work transition activities, and articulation of secondary and postsecondary career–technical programs

Individualized learning activities, including work-site learning activities, to better prepare individuals in the courses for their chosen occupational areas.

Sequencing of the course within a program is left to the discretion of the local college. Naturally, foundation courses related to topics such as safety, tool and equipment usage, and other fundamental skills should be taught first. Other courses related to specific skill areas and related academics, however, may be sequenced to take advantage of seasonal and climatic conditions, resources located outside of the school, and other factors. Programs that offer an Associate of Applied Science Degree must include all of the required Career Certificate courses, Technical Certificate courses **AND** a minimum of 15 semester hours of General Education Core Courses. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester. Each community college specifies the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college.

In order to provide flexibility within the districts, individual courses within a framework may be customized by doing the following:

Adding new student learning outcomes to complement the existing competencies and suggested objectives in the program framework.

Revising or extending the student learning outcomes

Adjusting the semester credit hours of a course to be up 1 hour or down 1 hour (after informing the Mississippi Community College Board [MCCB] of the change)

## APPENDIX C: COURSE CROSSWALK

<b>COURSE CROSSWALK</b> <b>Industrial Technology</b> CIP 15.0612 – Postsecondary Industrial Technology/Technician					
<i><b>Note: Courses that have been added or changed in the 2020 curriculum are highlighted.</b></i>					
Existing			Revised		
2014 MS Curriculum Framework			2020 MS Curriculum Framework		
Course Number	Course Title	Hours	Course Number	Course Title	Hours
ENT 1113	Graphic Communications	3	ENT 1113	Graphic Communications	3
ENT 1123	Computational Methods for Drafting	3	ENT 1123	Computational Methods for Drafting	3
ENT 1153	Basic Applications of Industrial Safety	3	ENT 1154	Basic Applications of Industrial Safety	4
ENT 1183	Spreadsheet Applications	3	ENT 1183	Spreadsheet Applications	3
ENT 1213	Materials	3	ENT 1213	Materials	3
ENT 1223	Industrial Power Tools Application*	3	ENT 1223	Industrial Power Tools Application*	3
ENT 1313	Principles of CAD	3	ENT 1313	Principles of CAD	3
ENT 1533	Blueprint Reading	3	ENT 1533	Blueprint Reading	3
ENT 1813	Basic Electricity and Electronics***	3	ENT 1813	Basic Electricity and Electronics***	3
ENT 2243	Cost Estimating	3	ENT 2243	Cost Estimating	3
ENT 2263	Quality Assurance	3	ENT 2263	Quality Assurance	3
ENT 2323	Industrial Welding and Metals*	3	ENT 2323	Industrial Welding and Metals *	3
ENT 2343	Advanced CAD	3	ENT 2343	Advanced CAD	3
ENT 2363	Computer Numerical Control Drafting (CNC)	3	ENT 2363	Computer Numerical Control Drafting	3
ENT 2443	Principles of Manufacturing Management	3	ENT 2443	Principles of Manufacturing Management	3
ENT 2523	Preventative Maintenance and Service of Equipment	3	ENT 2523	Intermediate Design	3
ENT 2613	Program Logic Controllers****	3	ENT 2613	Program Logic Controllers****	3
ENT 2723	Digital Studio	3	ENT 2723	Digital Studio	3
ENT 291 (1-3)	Special Project	(1-3)	ENT 291 (1-3)	Special Project	(1-3)

## APPENDIX D: RECOMMENDED TEXTBOOK LIST

Recommended Textbook List		
CIP 15.0612 Industrial Technology		
Book Title	Author(s)	ISBN
Technical Drawings 101 with AutoCAD	Fuller, Ramirez & Smith	978-1-63057-342-3
Practical Problems in Mathematics for Drafting and Design, 4th ed	Larkin/ Duval	978-1-111-31680-8
Occupational Safety and Health 9th ed	Goetch	9780134699912
Beginning Excel 2019	Open Oregon Educational Resources	<a href="https://open.umn.edu/opentextbooks/textbooks/70">https://open.umn.edu/opentextbooks/textbooks/70</a>
Construction Materials, Methods, and Techniques (4th ed.)	Spence, William Cengage	9781305086272
Fundamentals of Machining Processes	Abel-Gawad El-Hofy, Hassan CRC Press	978-1466577022
AutoCAD 2018 Tutorial First Level: 2D	Shih SDC Publications	978-1-63057-122-1
Print Reading for Industry 10 ed	Brown/Brown G-W	978-1-63126-051-3
Fundamentals of AC/DC	Lab Volt Systems	0-86657-000-4
Estimating for Residential Construction, 2nd ed	Orman	
TOTAL QUALITY HANDBOOK	GOETSCH/DAVIS	0-13-027262-0 Pren Hall
Modern Welding 12 ed	Bowditch G-W	978-1-63563-904-9
Parametric Modeling with Autodesk Inventor 2016	Shih SDC Publications	978-1-58503-971-5
CNC Mill	Intelitek	34-7547-0000
CNC Lathe	Intelitek	34-7538-0000
Fundamentals of Management 10 ed	Robbins, DeCenzo, Coulter Pearson	9780133499919
Programmable Logic Controllers	Petruszella, Frank	978-0073373843