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# Architectural Engineering Technology Mississippi Curriculum Framework

**Program CIP: 15.0101 – Postsecondary Architectural Engineering  
Technology/Technician**

October 2014



**Published by:**

Mississippi Community College Board  
Division of Workforce, Career, and Technical Education  
3825 Ridgewood Road  
Jackson, MS 39211  
Phone: 601-432-6155  
Email: [curriculum@mccb.edu](mailto:curriculum@mccb.edu)

## FACULTY WRITING TEAM MEMBERS

William Alexander, Holmes Community College, Goodman  
Cham Blain, Holmes Community College, Goodman  
Lynn Boykin, Holmes Community College, Ridgeland  
Craig Kirkendall, Holmes Community College, Ridgeland

## ADMINISTRATOR WRITING TEAM MEMBERS

Sherry Cheek, Vice President of Career and Technical Education,  
Holmes Community College  
Amy Whittington, Director of Career and Technical Education,  
Holmes Community College, Ridgeland  
Luke Jones, Director of Career and Technical Education,  
Holmes Community College, Goodman

## BUSINESS AND INDUSTRY WRITING TEAM MEMBERS

Robin Harkey, Industrial Engineer, Eaton Aerospace, Jackson, MS  
Mark Phillips, Detailing Supervisor, Gulf States Manufacturers, Starkville, MS  
Steven Prewitt, Department Manager, Anel Corporation, Winona, MS  
Betsy Morrow, Owner, Designers II, Flowood, MS  
Dan McQuirter, Senior Engineer, Nissan North America, Inc., Canton, MS  
Leah Walters, Senior Engineer, Nissan North America, Inc., Canton, MS  
John Wyatt, Mississippi State University, Starkville, MS

## OFFICE OF CURRICULUM AND INSTRUCTION TEAM MEMBERS

Rachel De Vaughan, Curriculum Specialist, Office of Curriculum and Instruction,  
Mississippi Community College Board  
Robin Parker, Director of Curriculum and Instruction, Office of Curriculum and  
Instruction, Mississippi Community College Board

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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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For information, please contact [curriculum@mccb.edu](mailto:curriculum@mccb.edu).

# CONTENTS

ADOPTION OF NATIONAL CERTIFICATION STANDARDS .....	6
INDUSTRY JOB PROJECTION DATA .....	7
ARTICULATION .....	7
TECHNICAL SKILLS ASSESSMENT .....	8
ONLINE AND BLENDED LEARNING OPPORTUNITIES .....	8
INSTRUCTIONAL STRATEGIES .....	8
ASSESSMENT STRATEGIES .....	8
CREDIT BY EXAMINATION .....	8
SUMMARY OF CURRICULUM REVISION CHANGES .....	8
PROGRAM DESCRIPTION .....	9
SUGGESTED COURSE SEQUENCE .....	10
Accelerated Pathway Credential .....	10
Career Certificate Required Courses .....	10
Technical Certificate Required Courses .....	11
General Education Core Courses .....	11
Technical Electives .....	12
CAREER CERTIFICATE REQUIRED COURSES .....	13
ENT 1113    Graphic Communications .....	13
ENT 1213    Materials .....	15
ENT 1313    Principles of CAD .....	17
ENT 1123    Computational Methods for Drafting .....	18
ENT 2243    Cost Estimating .....	19
ENT 1613    Architectural Design I .....	20
ENT 1413    Elementary Surveying .....	21
ENT 2623    Architectural Design II .....	22
ENT 2233    Structural Drafting .....	23
ENT 2353    B.I.M./Parametric Modeling .....	24
TECHNICAL CERTIFICATE REQUIRED COURSES .....	25
ENT 2643    Architectural Rendering .....	25
ENT 1533    Blueprint Reading .....	26
TECHNICAL ELECTIVE COURSES .....	27
ENT 1323    Intermediate CAD .....	27
ENT 1183    Spreadsheet Applications .....	28
ENT 1153    Basic Applications of Industrial Safety .....	29
ENT 2263    Quality Assurance .....	30
ENT 2723    Digital Studio .....	31
ENT 2713    Architectural History .....	32

**VALIDATION COPY**

ENT 2133	Professional Development .....	33
ENT 291(1-3)	Special Project .....	34
RECOMMENDED TOOLS AND EQUIPMENT.....		35
RECOMMENDED INSTRUCTIONAL AIDS.....		35
CURRICULUM DEFINITIONS AND TERMS .....		37

## ADOPTION OF NATIONAL CERTIFICATION STANDARDS

The **Accrediting Board for Engineering and Technology (ABET)** is a nonprofit, non-governmental organization that accredits college and university programs in the disciplines of applied science, computing, engineering, and engineering technology. ABET accredits over 3,300 programs at more than 680 colleges and universities in 24 countries. ABET provides specialized, programmatic accreditation that evaluates an individual program of study, rather than evaluating an institution as a whole.

ABET was founded in 1932 as the Engineers' Council for Professional Development (ECPD), an engineering professional body dedicated to the education, accreditation, regulation, and professional development of the engineering professionals and students in the United States. It was headquartered at the Engineering Societies Building and then the United Engineering Center in New York City until it relocated to Baltimore in 1996.

In 1936, ECPD evaluated its first engineering degree programs. Ten years later, the council began evaluating engineering technology degree programs. By 1947, ECPD had accredited 580 undergraduate engineering programs at 133 institutions.

Producing guidance and training publications was a large part of ECPD operations. The council produced dozens of books, pamphlets, brochures, and movies. Here are just a few of the many titles:

In 1997, following nearly a decade of development, ABET adopted Engineering Criteria 2000 (EC2000), considered at the time a revolutionary approach to accreditation criteria. EC2000 focused on what is learned rather than what is taught. At its core was the call for a continuous improvement process informed by the specific mission and goals of individual institutions and programs. Lacking the inflexibility of earlier accreditation criteria, EC2000 meant that ABET could enable program innovation rather than stifling it, as well as encourage new assessment processes and subsequent program improvement.

Today, the spirit of EC2000 can be found in the evaluation criteria of all ABET disciplines, and studies like Penn State's Engineering Change (PDF) prove those criteria are having an impact on accredited programs. ABET encourages the EC2000 perspective with other accreditation boards and degree programs, promoting global education and worker mobility through agreements like the Washington Accord, the Seoul Accord, and the Sydney Accord.

ABET accreditation, which is voluntary and achieved through a peer review process, provides assurance that a college or university program meets the quality standards established by the profession for which the program prepares its students. ABET is recognized by the Council for Higher Education Accreditation (CHEA).

ABET provides programmatic quality assurance for graduates of ABET-accredited programs who work in applied science, computing, engineering, and engineering technology and who are seeking professional recognition by enhancing their individual credentials through licensure, registration, and certification programs where appropriate.

For more information related to implementing ABET at your local campus, please visit <http://www.abet.org>.

## INDUSTRY JOB PROJECTION DATA

Architectural engineering technology occupations require an education level of an Associate of Applied Science degree. There is a 1% increase in occupational demand at the national level. Median annual income for engineering technicians is \$49,630.00 at the national level. A summary of occupational data from the Bureau of Labor Statistics Data Center is displayed below:

**Table 1: Education Level**

Program Occupations	Education Level
Engineering Technicians, Drafters	Associate Degree

**Table 2: Occupational Breakdown**

Description	2012 Jobs	2022 Jobs	Annual Openings	2010 Hourly Earnings	2010 Annual Earnings 2,080 Work Hours
Engineering Technicians, Drafters	199,800	202,000	1	\$23.86	\$49,630.00
TOTAL	199,800	202,000	1	\$23.86	\$49,630.00

**Table 3: Occupational Overview**

	United States
2012 Occupational Jobs	199,800
2022 Occupational Jobs	202,000
Total Change	2,200
Total % Change	1%
2012 Median Hourly Earnings	\$23.86
2012 Median Annual Earnings	\$49,630

**Table 4: Occupational Change**

Description	Employment, 2012	Employment, 2022	Change %	Change Number
Drafters	199,800	202,000	1	2,200
Architectural and Civil Drafters	87,900	88,500	1	700
Electrical and Electronics Drafters	29,600	32,500	10	2,900
Mechanical Drafters	66,700	63,400	-5	-3,300
Drafters, all others	15,600	17,600	13	2,000

## ARTICULATION

Secondary curriculum does not cover content to the same depth as the postsecondary curriculum; therefore, there is no statewide articulation agreement. 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:

Autodesk AutoCAD Certified User Exam

[http://www.certipoint.com/portal/DesktopDefault.aspx?page=common/pagelibrary/Autodesk\\_home.htm](http://www.certipoint.com/portal/DesktopDefault.aspx?page=common/pagelibrary/Autodesk_home.htm)

## 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.

## INSTRUCTIONAL STRATEGIES

The Accreditation Board for Engineering and Technology (ABET) standards were adopted and provide instructional strategies to faculty members implementing the curriculum.

## ASSESSMENT STRATEGIES

The ABET Standards were adopted for the Architectural Technology curriculum and provide assessment strategies to faculty members implementing the curriculum. Additionally, standards were included in course content when appropriate.

## 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)

## SUMMARY OF CURRICULUM REVISION CHANGES

The Architectural Engineering Technology curriculum is a new program. Changes will be documented in following revisions.



## PROGRAM DESCRIPTION

The Architectural Engineering Technology program educates students in the process of producing design projects from schematics through construction. The program is designed to prepare its graduates for employment in architectural related firms, including architectural offices, design building firms, engineering firms, governmental agencies, real estate developers, planning offices, and architectural material suppliers and manufacturers.

Upon successful completion of the curriculum, the graduate may earn a Career Certificate, a Technical Certificate or an Associate of Applied Science Degree (AAS) in Architectural Engineering Technology. Students will also be prepared to complete the Autodesk AutoCAD Certified User Exam.

## SUGGESTED COURSE SEQUENCE

### Accelerated Pathway Credential

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Clock Hours	Clock Hour Breakdown		Certification Information
			Lecture	Lab		Lecture	Lab	Certification Name
ENT 1313	Principles of CAD	3	2	2	90	30	60	
ENT 1213	Materials	3	2	2	90	30	60	
ENT 1113	Graphic Communications	3	2	2	90	30	60	
	Electives	6						
	<b>TOTAL</b>	<b>15</b>	<b>6</b>	<b>6</b>	<b>270</b>	<b>90</b>	<b>180</b>	

### Career Certificate Required Courses

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Clock Hours	Clock Hour Breakdown		Certification Information
			Lecture	Lab		Lecture	Lab	Certification Name
ENT 1313	Principles of CAD	3	2	2	90	30	60	Autodesk AutoCAD Certified User Exam
ENT 1213	Materials	3	2	2	90	30	60	
ENT 2243	Cost Estimating	3	2	2	90	30	60	
ENT 1113	Graphic Communications	3	2	2	90	30	60	
ENT 1123	Computational Methods for Drafting	3	2	2	90	30	60	
ENT 2353	B. I. M./Parametric Modeling	3	2	2	90	30	60	
ENT 1613	Architectural Design I	3	2	2	90	30	60	
ENT 1413	Elementary Surveying	3	2	2	90	30	60	
ENT 2623	Architectural Design II	3	2	2	90	30	60	
ENT 2233	Structural Drafting	3	2	2	90	30	60	
	<b>TOTAL</b>	<b>30</b>			<b>900</b>	<b>300</b>	<b>600</b>	

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### Technical Certificate Required Courses

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Clock Hours	Clock Hour Breakdown		Certification Information
			Lecture	Lab		Lecture	Lab	Certification Name
ENT 2643	Architectural Rendering	3	2	2	90	30	60	
ENT 1533	Blueprint Reading	3	2	2	90	30	60	
	Approved Technical Electives	9						
<b>TOTAL</b>		<b>15</b>			<b>180</b>	<b>60</b>	<b>120</b>	

### 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 (SACS) Commission on Colleges Standard 2.7.3 from the Principles of Accreditation: Foundations for Quality Enhancement<sup>1</sup> describes the general education core.

Section 2.7.3 In each undergraduate degree program, the institution requires the successful completion of a general education component at the collegiate level that (1) is substantial component of each undergraduate degree, (2) ensures breadth of knowledge, and (3) is based on a coherent rationale. For degree completion in associate programs, the component constitutes a minimum of 15 semester hours or the equivalent. These credit hours are to be drawn from and include at least one course from the following areas: humanities/fine arts, social/behavioral sciences, and natural science/mathematics. The courses do not narrowly focus on those skills, techniques, and procedures specific to a particular occupation or profession.

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<sup>1</sup>

Southern Association of Colleges and Schools Commission on Colleges. (2012). *The principles of accreditation: Foundations for quality enhancement*. Retrieved from <http://www.sacscoc.org/pdf/2012PrinciplesOfAccreditation.pdf>

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**Technical Electives**

Course Number	Course Name	Semester Credit Hours	SCH Breakdown			Total Clock Hours	Clock Hour Breakdown			Certification Information
			Lecture	Lab	Clinical/ Internship		Lecture	Lab	Clinical/ Internship	Certification Name
ENT 1153	Basic Applications of Industrial Safety	3	2	2		90	30	60		
ENT 1183	Spreadsheet Applications	3	2	2		90	30	60		
ENT 2133	Professional Development	3	2	2		90	30	60		
ENT 2263	Quality Assurance	3	2	2		90	30	60		
ENT 2723	Digital Studio	3	2	2		90	30	60		
ENT 2713	Architectural History	3	2	2		90	30	60		
ENT 1323	Intermediate CAD	3	2	2		90	30	60		
ENT 291(1-3)	Special Project	1-3		2-6		60-180		60-180		
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			3-18	135-810			135-810	
	Other Instructor Approved Elective(s)									

## CAREER CERTIFICATE REQUIRED COURSES

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

**Classification:** Career Certificate Core Requirement

**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	90

**National Assessment:** Components of the Autodesk AutoCAD Certified User Exam

**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.
  - 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.
  - 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.
  - 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.
  - 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.

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7. Dimension objects.
  - 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.
  - a. Construct full and half sectional views.
  - b. Recognize and construct removed, revolved, offset, and aligned sectional views.

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**Course Number and Name:**            **ENT 1213            Materials**

**Classification:**                            Career Certificate Core Requirement

**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	90

**National Assessment:**                None

**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.

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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.



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

**Classification:**                            Career Certificate Core Requirement

**Description:**                              This course is designed to teach students the basic operating system and drafting skills.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	90

**National Assessment:**                Components of the Autodesk AutoCAD Certified User Exam

**Prerequisite:**                              None

**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.
  - 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.
  - a. Construct single-view and multi-view drawings.
  - b. Modify or edit an existing drawing.
  - c. Modify the existing system variables.

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**Course Number and Name:**           **ENT 1123            Computational Methods for Drafting**

**Classification:**                           Career Certificate Core Requirement

**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	90

**National Assessment:**               Components of the Autodesk AutoCAD Certified User Exam

**Prerequisite:**                           None

**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.
  - 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.

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**Course Number and Name:**           **ENT 2243**           **Cost Estimating**

**Classification:**                           Career Certificate Core Requirement

**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	90

**National Assessment:**                Components of the Autodesk AutoCAD Certified User Exam

**Prerequisite:**                            None

**Student Learning Outcomes:**

1. Prepare a cost estimate of an assigned building.
  - 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.

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**Course Number and Name:**        **ENT 1613        Architectural Design I**

**Classification:**                      Career Certificate Core Requirement

**Description:**                         This course is a study and development of architectural design principles for a residential structure.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	90

**National Assessment:**              Components of the Autodesk AutoCAD Certified User Exam

**Prerequisite:**                         Instructor Approved

**Student Learning Outcomes:**

1. Plan a residential structure.
  - a. Define architectural terms.
  - b. Describe the planning areas.
  - c. Identify and apply building codes.
  
2. Draw a set of working drawings for a residential structure.
  - a. Select the correct scale for the different drawings.
  - b. Draw a floor plan.
  - c. Draw a set of exterior elevations.
  - d. Draw a site plan.
  - e. Draw an electrical plan.
  - f. Draw interior elevations and details as needed.
  - g. Create a window and door schedule.
  - h. Draw necessary details and section views.
  - i. Draw a foundation plan with details.

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**Course Number and Name:**           **ENT 1413           Elementary Surveying**

**Classification:**                           Career Certificate Core Requirement

**Description:**                           This course is designed to give the student a basic course regarding the principles and practices of plane surveying, including measurements for distance, direction and elevation including an introduction to the care and use of surveying instruments and equipment.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	90

**National Assessment:**               Components of the Autodesk AutoCAD Certified User Exam

**Prerequisite:**                           Instructor Approved

**Student Learning Outcomes:**

1. Review technical standards and registration requirements set by the State of Mississippi for Land Surveyors and Civil Engineers.
  - a. Explain the rights, duties and liabilities.
  - b. Discuss registration laws and examinations.
  
2. Collect and record various measurements.
  - a. Describe the use of the United States Geological Survey benchmark.
  - b. Identify, explain and setup basic surveying equipment.
  - c. Measure horizontal and vertical angles.
  - d. Measure horizontal and vertical distances.
  - e. Demonstrate differences in elevation between various points.
  - f. Record and interpret field notes.

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**Course Number and Name:**           **ENT 2623            Architectural Design II**

**Classification:**                           Career Certificate Core Requirement

**Description:**                           This course is designed to emphasize standard procedures and working drawings. Details involving architectural, mechanical, electrical, and structural drawings are covered, along with presentation of drawings and computer-aided design assignments.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	90

**National Assessment:**               Components of the Autodesk AutoCAD Certified User Exam

**Prerequisite:**                            Instructor Approved

**Student Learning Outcomes:**

1. Create a set of custom residential or light commercial working drawings.
  - a. Develop and draw a plot plan.
  - b. Design and draw a foundation plan and details.
  - c. Design and draw a floor plan and schedules.
  - d. Draw all four elevations.
  - e. Design and draw cabinets and sectional views.
  - f. Lay out and draw an electrical plan.
  
2. Develop a presentation drawing.
  - a. Construct a plan view of property with rendering and landscaping.
  - b. Construct a front elevation with rendering and landscaping.
  - c. Construct a sales proposal utilizing the floor plan.

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**Course Number and Name:**           **ENT 2233            Structural Drafting**

**Classification:**                           Career Certificate Core Requirement

**Description:**                           This course is designed to teach students structural section, terms, and conventional abbreviations and symbols used by structural fabricators and erectors are studied. Knowledge is gained in the use of the A.I.S.C. Handbook. Problems are studied that involve structural designing and drawing of beams, columns, connections, trusses, and bracing (steel, concrete, and wood).

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	90

**National Assessment:**               Components of the Autodesk AutoCAD Certified User Exam

**Prerequisite:**                            Instructor Approved

**Student Learning Outcomes:**

1. Utilize data on design of structural members.
  - a. Identify and describe physical properties of materials.
  - b. Read and interpret data utilizing standard references.
  
2. Construct structural plans.
  - a. Draw a detail of connections of structural members.
  - b. Draw structural framing plans.

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**Course Number and Name:**            **ENT 2353**            **B.I.M./Parametric Modeling**

**Classification:**                            Career Certificate Core Requirement

**Description:**                              This course is designed to give the student a continuation of CAD. Emphasis is placed on the managing Building Information Model.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	90

**National Assessment:**                    Components of the Autodesk AutoCAD Certified User Exam

**Prerequisite:**                                Instructor Approved

**Student Learning Outcomes:**

1. Manage Building Information Model (B.I.M.).
  - a. Create Building Information Model B.I.M.
  - b. Manipulate Building Information Model B.I.M.
  - c. Analyze Building Information Model B.I.M.
  
2. Manage the CAD system to improve productivity.
  - a. Perform customization to improve productivity.
  - b. Export data into computational software for manipulation.



## TECHNICAL CERTIFICATE REQUIRED COURSES

**Course Number and Name:** ENT 2643 Architectural Rendering

**Classification:** Technical Certificate Core Requirement

**Description:** This course is designed to give the student visual expression or architectural principles and structures. This course will include perspective, shade, shadow and color using pencil, pen & ink, paint and new media.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	90

**National Assessment:** None

**Prerequisite:** Instructor Approved

**Student Learning Outcomes:**

1. Describe various methods and media available to architects.
  - a. Describe types of paper and use for each.
  - b. Describe various drawing styles.
  - c. Identify methods for application of color and shade.
  - d. Describe the method for computer rendering.
2. Draw a rendered drawing of a simple architectural structure with entourage.
  - a. Select the correct media for projects.
  - b. Demonstrate the ability to use pencils, watercolors, and the computer to draw, render, and shade.
  - c. Demonstrate the ability to use perspectives and utilize proper proportions in drawing compositions.

**VALIDATION COPY**

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

**Classification:**                        Technical Certificate Core Requirement

**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	90

**National Assessment:**           None

**Prerequisite:**                         None

**Student Learning Outcomes:**

1. Use the basic drawing equipment and terms used in sketching and making drawings.
  - 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.

## TECHNICAL ELECTIVE COURSES

**Course Number and Name:**            **ENT 1323**            **Intermediate CAD**

**Classification:**                            Technical Elective

**Description:**                                This course is designed to give the student continuation of Principles of CAD (ENT 1313). Subject areas include dimensioning, file manipulation, symbols and 3-D wireframe and solid modeling.

<b>Hour Breakdown:</b>	Scheduled Hours	Lecture	Lab	Clock Hours
	3	2	2	90

**National Assessment:**                    None

**Prerequisite:**                                Instructor Approved

**Student Learning Outcomes:**

1. Dimension drawings by the use of CAD.
  - a. Draw and dimension per industry standards.
  - b. Apply dimensions using unidirectional and aligned systems of dimensions.
  
2. Manipulate data between files.
  - a. Export drawing data/files.
  - b. Import drawing data/files.
  - c. Translate drawing data/files.
  - d. Minimize file size.
  - e. Utilize external reference files.
  
3. Develop a symbol library, and assign attributes.
  - a. Assign visible and hidden values to blocks.
  - b. Create/Edit attributes in blocks and dynamic blocks.
  - c. Construct a template file for the collection of block attributes.
  - d. Collect attribute values of a bill of materials.
  
4. Execute various plots using layouts (paper space).
  - a. Create and manage view ports.
  - b. Assign plotting scales to view ports.
  
5. Manage 3-D wireframe models.
  - a. Create 3-D wireframe models.
  - b. Manipulate 3-D wireframe models.
  - c. Analyze 3-D wireframe models.

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**Course Number and Name:**           **ENT 1183            Spreadsheet Applications**

**Classification:**                           Technical Elective

**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	90

**National Assessment:**               None

**Pre-requisite:**                           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.

**VALIDATION COPY**

**Course Number and Name:**            **ENT 1153            Basic Applications of Industrial Safety**

**Classification:**                            Technical Elective

**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
3	2	2	90

**National Assessment:**                None

**Prerequisite:**                            None

**Student Learning Outcomes:**

1. Introduction to basic safety and related laws.
  - a. Study various types of accidents.
  - b. Rights and responsibilities of employees and employers.
  - c. Learn concepts about OSHA and EPA regulations.
  
2. Introduction of the human element.
  - a. Introduction to specific job Personal Protection Equipment (PPE).
  - b. Study of ergonomics.
  
3. 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. Management of safety and health.
  - a. Introduction to electrical protection.
  - b. Introduction to basic fire protection.
  - c. Introduction to personal health protection.
  
5. Basic safe work practices.

**VALIDATION COPY**

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

**Classification:**                            Technical Elective

**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	90

**National Assessment:**                None

**Pre-requisite:**                            None

**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.

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**Course Number and Name:**           **ENT 2723            Digital Studio**

**Classification:**                           Technical Elective

**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	90

**National Assessment:**               None

**Pre-requisite:**                           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. Make 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.

**VALIDATION COPY**

**Course Number and Name:**        **ENT 2713        Architectural History**

**Classification:**                    Technical Elective

**Description:**                      This course is designed to give the student an analysis of achievements in the design and construction of major architectural developments from early times to present.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	90

**National Assessment:**            None

**Pre-requisite:**                      Instructor Approved

**Student Learning Outcomes:**

1. Discuss architectural history through a survey of historical architectural developments and the effects of changing human needs on predominate architectural styles.
2. Explore the philosophy of architecture through many periods from the pragmatic approach of serving practical human needs to expressive idealism.
3. Investigate the relationship of available materials and the structural systems to the development of architectural styles.
  - a. Create a multimedia presentation outlining architectural history.



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**Course Number and Name:**            **ENT 2133            Professional Development**

**Classification:**                            Technical Elective

**Description:**                              This course emphasizes an awareness of interpersonal skills essential for job success.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	90

**National Assessment:**                None

**Prerequisite:**                              None

**Student Learning Outcomes:**

1. Develop skills for personal and professional development.
  - a. Describe the benefits of professional affiliations and certification programs.
  - b. Develop a plan for personal, educational, and professional growth.
  
2. Demonstrate essential skills for the employment process.
  - a. Identify techniques to build a positive self-image.
  - b. Research sources for locating job opportunities.
  - c. Explore effective employment skills.
  
3. Demonstrate interpersonal skills that affect personal and professional development.
  - a. Discuss principles of effective time, stress, and money management.
  - b. Apply problem-solving and conflict-resolution skills to given case studies.
  
4. Develop tools to enhance career outlook opportunities.
  - a. Create a professional resume.
  - b. Create a professional portfolio.

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**Course Number and Name:**           **ENT 291(1-3)    Special Project**

**Classification:**                        Technical Elective

**Description:**                         This course is designed to give the student practical application of skills and knowledge gained in other drafting courses. The instructor works closely with the student to ensure that the selection of a project will enhance the student’s learning experience.

**Hour Breakdown:**

Scheduled Hours	Lecture	Lab	Clock Hours
1		2	60
2		4	120
3		6	180

**National Assessment:**               None

**Prerequisite:**                         Instructor Approved

**Student Learning Outcomes:**

1. Develop a written plan that details the activities and projects to be completed.
  - a. Utilize a written plan that details the activities and projects to be completed.
  - b. Perform written occupational objectives in the special project.
  
2. Assess accomplishment of objectives.
  - a. Prepare a weekly written assessment of accomplishment of objectives.
  - b. Present weekly written reports of activities performed and objectives accomplished to the instructor.
  
3. Utilize a set of written guidelines for the project.
  - a. Develop and follow a set of written guidelines for the special project.

## RECOMMENDED TOOLS AND EQUIPMENT

### Capitalized

1. CAD stations/chairs with Internet access (20 per instructor)
  - a. CAD software
  - b. Building Information Modeling software with parametric
  - c. Architectural software
  - d. Civil software
  - e. Applications and multimedia software
2. Estimating software
3. Rendering software
4. Plotters (2)
5. Inkjet printers/laser printers (4; 2 color and 2 black and white laserjet/inkjet)
6. 3 D plotter (1 per 4 students)
7. Large format copier/scanner
8. Total station with data collector and controller, software, and accessories (1 per 4 students)
9. GPS equipment with data collector and controller, software, and accessories (1 per 4 students)

### Non-Capitalized

1. Parallel bars (20)
2. Paper cutters (2)
3. CAD station desk with chairs (1 per student)
4. Survey rods (1 per 4 students)
5. Range poles (1 per 4 students)
6. Chains, steel tapes 100 ft. or 200 ft. (1 per 4 students)
7. Chaining pins, set of 11 with holder (1 set per 4 students)
8. Hammers (2 lb.) (1 per 4 students)
9. Wooden stakes (1 lot)
10. Ribbon flagging (1 lot)
11. Survey markers (1 lot)
12. Plumb bobs with holder and string (2 per 4 students)
13. Digital caliper, English and Metric (1 per 4 students)
14. Dial caliper, English and Metric (1 per 4 students)
15. Digital micrometer, English and Metric (1 per 4 students)
16. Dial micrometer, English and Metric (1 per 4 students)
17. Metal protractor, 6 in. (1)
18. GPS handheld units (1 per 2 students)
19. Surveying metal detector (1)
20. Light tables (2)
21. Prisma Color Markers (1 set per 4 students)
22. Prisma Color On Color Pencils (1 set per 4 students)
23. Vellum
24. Trace paper

## RECOMMENDED INSTRUCTIONAL AIDS

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

1. Scientific calculator/construction calculator (1)
2. Cart, AV (for overhead projector) (1)
3. Cart, AV (for TV and VCR/DVD with data projector) (1)

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4. Computer with operating software with multimedia kit and Internet access (1)
5. Inkjet/Laser printer
6. Projector, overhead (1)
7. TV monitor and VCR/DVD player (1)
8. Video/Audio data projector (1)
9. Laptop computer (1)
10. Digital camera/video camera (1)
11. Scanner (1)

## 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:
  - Career Certificate Required Course – A required course for all students completing a career certificate.
  - Technical Certificate Required Course – A required course for all students completing a technical certificate.
  - 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 course
- 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:

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- 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)