CIVIL ENGINEERING TECHNOLOGY
MISSISSIPPI CURRICULUM FRAMEWORK

Civil Engineering Technology - CIP: 15.0201 (Civil Engineering Technology/Technician)

2018

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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.

For information, please contact curriculum@mccb.edu

NATIONAL CERTIFICATION & STANDARDS

National Center for Construction Education & Research (NCCER)

NCCER is a not-for-profit 501(c)(3) education foundation created in 1996 as The National Center for Construction Education and Research. It was developed with the support of more than 125 construction CEOs and various association and academic leaders who united to revolutionize training for the construction industry. Sharing the common goal of developing a safe and productive workforce, these companies created a standardized training and credentialing program for the industry. This progressive program has evolved into curricula for more than 70 craft areas and a complete series of more than 70 assessments offered in over 4,000 NCCER-accredited training and assessment locations across the United States.

NCCER develops standardized construction and maintenance curriculum and assessments with portable credentials. These credentials are tracked through NCCER's Registry System that allows organizations and companies to track the qualifications of their craft professionals and/or check the qualifications of possible new hires. NCCER's Registry System also assists craft professionals by maintaining their records in a secure database.

NCCER's workforce development process of accreditation, instructor certification, standardized curriculum, registry, assessment and certification is a key component in the industry's workforce development efforts. NCCER also drives multiple initiatives to enhance career development and recruitment efforts for the industry, primarily through its Build Your Future initiative.

NCCER's new branding and international initiatives have led to the use of NCCER in lieu of The National Center for Construction Education and Research. The same great resources and services are still available.

NCCER is headquartered in Alachua, Florida, and is affiliated with the University of Florida's M.E. Rinker, Sr. School of Construction Management.

For more information, please visit www.nccer.org.

Industry Job Projection Data

Civil Engineering requires an Associate Degree. There is expected to be a 2.87% increase in occupational demand at the regional level and the state level and 1.43% increase at the national level. Median annual income for this occupation is $34,174.40 at the state level. A summary of occupational data from www.swib.ms.gov/DataCenter/ is displayed below:

Table 1: Education Level

Program Occupations	Education Level
Civil Engineering Technicians	Associate Degree

Table 2: Occupational Overview

	Region	State	United States
2014 Occupational Jobs	1009	1009	63960
2024 Occupational Jobs	1038	1038	64877
Total Change	29	29	917
Total % Change	2.87%	2.87%	1.43%
2014 Median Hourly Earnings	$16.43	$16.43	$23.24
2014 Median Annual Earnings	$34, 174.40	$34,174.40	$48,339.20
Annual Openings	2	2	91

Table 3: Occupational Breakdown

Description	2014 Jobs	2024 Jobs	Annual Openings	2014 Hourly Earnings	2014 Annual Earnings 2,080 Work Hours
Civil Engineering Technicians	1009	1038	2	$16.43	$34,174.40

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
Civil Engineering Technicians	29	2.87%	2.87%	1.43%

Articulation

Articulation credit from Secondary Architecture and Drafting (CIP: 15.301) and Secondary Engineering (CIP 14.0101) to Postsecondary Civil Engineering Technology (CIP: 15.0201) will be awarded upon implementation of this curriculum by the college. The courses to be articulated are with the stipulation of passing the MS-CPAS2.

Articulated Secondary Program	Postsecondary Program	Articulated Postsecondary Course
Architecture and Drafting (CIP: 15.1301)	Civil Engineering Technology (CIP: 15.0201)	DDT 1163 Engineering Graphics or DDT 1313 Computer Aided Design I
Engineering (CIP: 14.0101)		

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	
15.0201	Civil Engineering Technology	
Level	**Standard Assessment**	**Alternate Assessment**
Career & Technical	MS-CPAS3	National Center for Construction Education & Research (NCCER) • Core Curriculum: Introductory Craft Skills • Site Layout (Level I)

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

Instructional strategies for faculty members implementing the curriculum can be found through the Office of Curriculum and Instruction's professional development.

Assessment Strategies

The Office of Curriculum and Instruction's professional development offer assessment strategies to faculty members implementing the curriculum. Additionally, standards were included in course content when appropriate.

Research Abstract

In the spring of 2017, the Office of Curriculum and Instruction (OCI) met with the different industry members who made up the advisory committees for the Civil Engineering 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 the college involved with this program were asked to give input related to changes to be made to the curriculum framework. Specific comments related to soft skills needed in this program include having a positive attitude, being at work every day and on time, and having reading and writing skills to complete work orders and other forms. Occupation-specific skills stated include knowing how to communicate with the customers, basic math skills, troubleshooting with customer concerns, and understanding the importance of confidentiality.

Included in this revision is the addition of Introduction to Craft Skills (CIT 1133). In addition, the following course titles were updated.

2011 Framework	2017 Framework
CIT 1213 Road Construction Methods and Materials	CIT 1213 Civil Construction Methods and Materials
CIT 1223 Road Construction Plans and Specifications	CIT 1223 Construction Plans and Specifications
CIT 2513 Water and Water Distribution	CIT 2513 Hydraulic Design

Revision History

2011, Research and Curriculum Unit, Mississippi State University
2018, Office of Curriculum and Instruction, Mississippi Community College Board

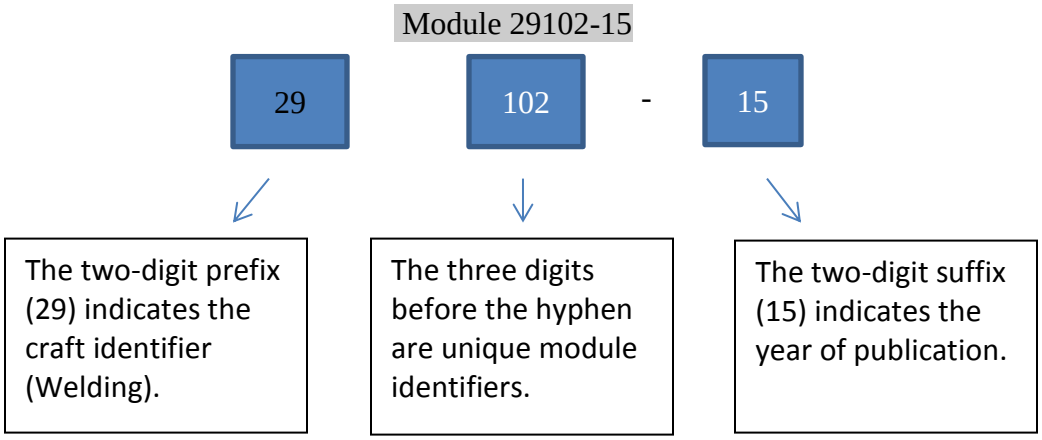
CREDIT BY EXAMINATION

The following **NCCER** modules are aligned to courses listed below. Each module 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	NCCER Credential and Module
CIT 1133 Introduction to Craft Skills or CTE 1143 Fundamentals of Construction	NCCER Core Curriculum 1. Module 00101-09 Basic Safety 2. Module 00102-09 Introduction to Construction Math 3. Module 00103-09 Introduction to Hand Tools 4. Module 00104-09 Introduction to Power Tools 5. Module 00105-09 Introduction to Construction Drawing 6. Module 00106-09 Basic Rigging 7. Module 00107-09 Basic Communication Skills 8. Module 00108-09 Basic Employability Skills 9. Module 00109-09 Introduction to Materials Handling
CIT 1113 Route Surveying	Site Layout Level I 1. Module 78101-04 Introduction to Site Layout
CIT 1413 Elementary Surveying	Site Layout Level I 1. Module 78103-04 Survey Equipment Use and Care One
CIT 1223 Road Construction Plans and Specifications	Site Layout Level I 1. Module 78104-04 Blueprint Reading for Surveyors
CIT 2434 Land Surveying Lab	Site Layout Level I 1. Module 78102-04 Surveying Math

How to Decode a Module Number

NCCER module numbers are divided into three parts. This structure allows users to easily track training histories and revisions from one edition to the next.



Program Description

This program prepares a person for entry level positions in the civil engineering field. The curriculum includes surveying, principles of road construction, and general construction practices.

The graduate is prepared to work with the civil engineer and surveyor in the performance of general engineering practices which may include design; drawing and interpreting working drawings; determining equipment, materials, and labor required to complete a project; and performing various tests required for construction. Up-to-date equipment usage is stressed, including use of the surveying computer and electronic distance measuring devices.

A minimum of 60 semester credit hours is required to receive an Associate of Applied Science in Civil Engineering Technology. Students who complete a minimum of 30 semester credit hours in the program may be eligible to receive a career certificate in Civil Engineering Technology.

SUGGESTED COURSE SEQUENCE

ACCELERATED INTEGRATED CAREER PATHWAY

			SCH Breakdown			Program Certifications
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	
DDT 1163	Engineering Graphics	3	2	2	60	
CIT 1213	Road Design and Construction Methods and Materials	3	3	0	45	
	Technical Electives	9				
	Total	**15**				

CAREER CERTIFICATE REQUIRED COURSES

			SCH Breakdown			Program Certifications
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	
CIT 1133 Or CTE 1143	Introduction to Craft Skills Or Fundamentals of Construction	3	2	2	60	NCCER Core Curriculum
DDT 1163	Engineering Graphics	3	2	2	60	
CIT 1413	Elementary Surveying	3	3	0	45	Site Layout Level I: Survey Equipments Use and Care One
CIT 1213	Civil Construction Methods and Materials	3	3	0	45	
DDT 1313	Computer Aided Design I	3	2	2	60	
CIT 1113	Route Surveying	3	3	0	45	Site Layout Level I: Introduction to Site Layout
CIT 1223	Construction Plans and Specifications	3	3	0	45	Site Layout Level I: Blueprint Reading for Surveyors
	Technical Electives	9				
	Total	**30**				

TECHNICAL CERTIFICATE REQUIRED COURSES

			SCH Breakdown			Program Certifications
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	
CIT 2433	Land Surveying	3	2	2	60	Site Layout Level I: Surveying Math
CIT 2113	Legal Principles of Surveying I	3	3	0	45	
CIT 2443	GPS Surveying	3	2	2	60	
CIT 2423 Or DDT 2153	Mapping and Topography Or Civil Planning and Design	3	2	2	60	
	Technical Electives	3				
	TOTAL	**15**				

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 Enhancement1 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.

			SCH Breakdown			Program Certifications
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	
	Humanities/Fine Arts	3				
	Social/Behavioral Sciences	3				
	Math/Science	3				
	Other academic courses per local community college requirements for AAS degree	6				
	TOTAL	**15**				

VALIDATION

CIVIL ENGINEERING TECHNOLOGY COURSES

*Any course not listed as a required course may be used as an elective.

			SCH Breakdown			Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Externship	
CIT 1133	Introduction to Craft Skills	3	2	2		NCCER Core Curriculum
CIT 1113	Route Surveying	4	2	4		Site Layout Level I: Introduction to Site Layout
CIT 1213	Civil Construction Methods and Materials	3	3	0		
CIT 1223	Construction Plans and Specifications	3	3	0		Site Layout Level I: Blueprint Reading for Surveyors
CIT 1413	Elementary Surveying	3	1	4		Site Layout Level I: Survey Equipments Use and Care One
CIT 2113	Legal Principles of Surveying	3	2	2		
CIT 2124	Advanced Surveying Practices	4	2	4		
CIT 2313	Soil Mechanics	3	2	2		
CIT 2413	Concrete and Hot Mix Asphalt Testing	3	2	2		
CIT 2423	Mapping and Topography	3	2	2		
CIT 2433	Land Surveying	3	2	2		Site Layout Level I: Surveying Math
CIT 2443	GPS Surveying	3	2	2		
CIT 2453	Fundamentals of Geographical Information Systems (GIS)	3	2	2		
CIT 2523	Hydraulic Design	3	2	2		
CIT 291(1-3)	Special Project	1-3		2-6		
CIT 292(1-6)	Supervised Work Experience in Civil Engineering Technology	1-6			3-18	
	All other electives approved by instructor per local community college policy					

COURSE DESCRIPTIONS

Course Number and Name: **CIT 1133** **Introduction to Craft Skills**

Description: This module explains the role of safety in the construction crafts. Trainees will learn how to identify and follow safe work practices and procedures as well as how to properly inspect and use safety equipment. Trainees will be able to describe safe work procedures for lifting heavy objects, fighting fires, and working around electrical hazards.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 00101-09 (Basic Safety)

1. Explain the idea of a safety culture and its importance in the construction crafts.
2. Identify causes of accidents and the impact of accident costs.
3. Explain the role of OSHA in job-site safety.
4. Explain OSHA's General Duty Clause and 1926 CFR subpart C.
5. Recognize hazard recognition and risk assessment techniques.
6. Explain fall protection, ladder, stair, and scaffold procedures and requirements.
7. Identify struck by hazards and demonstrate safe working procedures and requirements.
8. Identify caught-in-between hazards and demonstrate safe working procedures and requirements.
9. Define safe work procedures to use around electrical hazards.
10. Demonstrate the use and care of appropriate personal protective equipment (PPE).
11. Explain the importance of hazard communications (HazCom) and material safety data sheets (MSDSs).
12. Identify other construction hazards on your job site, including hazardous material exposures, environmental elements, welding and cutting hazards, confined spaces, and fires.

Module 00102-09 (Introduction to Construction Math)

1. Add, subtract, multiply, and divide whole numbers, with and without a calculator.
2. Use a standard ruler, a metric ruler, and a measuring tape to measure.
3. Add, subtract, multiply, and divide fractions.
4. Add, subtract, multiply, and divide decimals, with and without a calculator.
5. Convert decimals to percentages and percentages to decimals.
6. Convert fractions to decimals and decimals to fractions.
7. Explain what the metric system is and how it is important in the construction trade.
8. Recognize and use metric units of length, weight, volume, and temperature.
9. Recognize some of the basic shapes used in the construction industry and apply basic geometry to measure them.

Module 00103-09 (Hand Tools)

1. Visually inspect the following tools to determine if they are safe to use:
    a. Hammer
    b. Screwdriver
    c. Saw
2. Make a straight square cut using a crosscut saw.
3. Safely and properly use a minimum of three of the following tools:
    a. Hammer and cat's paw (to drive and pull nails)
    b. Screwdriver (slotted or Phillips)
    c. Adjustable wrench

d. CHANNELLOCK ®pliers
e. Spirit level
f. Carpenter's square and steel tape
g. Saw

Module 00104-09 (Power Tools)

1. Identify power tools commonly used in the construction trades.
2. Use power tools safely.
3. Explain how to maintain power tools properly.

Module 00105-09 (Construction Drawings)

1. Recognize and identify basic construction drawing terms, components, and symbols.
2. Relate information on construction drawings to actual locations on the print.
3. Recognize different classifications of construction drawings.
4. Interpret and use drawing dimensions.

Module 00106-09 (Basic Rigging)

1. Identify and describe the use of slings and common rigging hardware.
2. Describe basic inspection techniques and rejection criteria used for slings and hardware.
3. Describe basic hitch configurations and their proper connections.
4. Describe basic load-handling safety practices.
5. Demonstrate proper use of American National Standards Institute (ANSI) hand signals.

Module 00107-09 (Basic Communication Skills)

1. Interpret information and instructions presented in both verbal and written form.
2. Communicate effectively in on-the-job situations using verbal and written skills.
3. Communicate effectively on the job using electronic communication devices.

Module 00108-09 (Basic Employability Skills)

1. Explain your role as an employee in the construction industry.
2. Demonstrate critical thinking skills and the ability to solve problems using those skills.
3. Demonstrate knowledge of computer systems and explain common uses for computers in the construction industry.
4. Define effective relationship skills.
5. Recognize issues such as sexual harassment, stress, and substance abuse.

Module 00109-09 (Introduction to Materials Handling)

1. Define load.
2. Establish a pre-task plan prior to moving a load.
3. Use proper materials-handling techniques.
4. Choose appropriate materials-handling equipment for the task.
5. Recognize hazards and follow safety procedures required for materials handling.

VALIDATION

Course Number and Name: **CIT 1113** **Route Surveying**

Description: This course teaches highway route design and factors in route location. The calculation and layout of simple horizontal and vertical curves, grades, and related earthwork are covered. Modern surveying, measuring, and mapping instruments, including electronic total stations with data collectors, are used.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss the various types of curves.
   a. Describe simple, compound, reverse, and spiral curves.
   b. Describe vertical curves.
2. Develop the ability to lay out highways and transportation routes.
   a. Calculate and stake circular curves.
   b. Calculate and stake vertical curves.
   c. Calculate and stake construction grades
   d. Calculate quantities from profiles and cross sections.
3. **Module 78101-04 (Introduction to Site Layout)**
   a. State the purpose of site layout and describe the role of a site layout technician in the construction industry.
   b. Describe the different kinds of surveys related to the construction project.
   C. Explain the relationship between Earth's latitude and longitude and how these lines are used.
   d. Define the various survey control points used in the process of site layout.
   e. Explain the meaning of terminology used in site layout.
   f. Identify the career opportunities available to people in the site layout field.
   g. State the rules for the professional and ethical conduct of a site layout person.
   h. Set up a builder's level, shoot an elevation, and properly record the data.
   i. Take an inverted rod reading.
   j. Chain a distance on even terrain and correctly record the data.
   k. Use a plumb bob correctly.
   l. Set up a tripod correctly.

Standards:
Manual of Surveying Instructions

The Direction of Lines	(2-17 to 2-52)
The Direction of Lines	(2-53 to 2-73)
Limits of Closure	(3-124)
General Field Methods	(6-19 to 6-24)

VALIDATION

Course Number and Name: **CIT 1213** **Civil Construction Methods and Materials**

Description: A study of equipment, construction methods, and materials used in the construction of roadways and drainage structures.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify the types of road construction methods and equipment.
   a. Describe the nature, properties, and use of road construction materials and equipment.
   b. Discuss the principles of roadbed construction.
   c. Explain the environmental impact of highways.
   d. Describe the techniques of highway maintenance and rehabilitation.
   e. Explain the construction of cuts and fills.
   f. Calculate granular base courses and treated base courses.
2. Identify the types of drainage structure, construction methods, and materials.
   a. Describe the nature, properties, and use of drainage structure materials and equipment.
   b. Describe the construction procedures and processes of drawing drainage and structures.
   c. Calculate grade cutoff of pilings.
   d. Calculate flow line of drainage structures.

Standards:
Construction Specifications Institute

Division 34 – Transportation

34 70 00 Transportation Construction and Equipment
34 71 00 Roadway Construction

VALIDATION

Course Number and Name: **CIT 1223** **Construction Plans and Specifications**

Description: A course to provide students with an introduction to the plans and specifications for the construction of streets and highways. Includes instruction in the interpretation of plans and specifications, the bidding process, and estimation of material and labor costs.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Interpret and develop construction prints.
   a. Read and interpret typical construction blueprints.
   b. Read and interpret symbols, layout, and organizations of plans and specifications.
   c. Discuss the development of site construction plans and specifications.
2. Apply principles of contracts.
   a. Describe the bidding procedure of competitive and negotiated contracts.
   b. Identify the parties involved in the construction process.
   c. Estimate the costs of material and labor required to complete a simple road construction contract.
3. **Module 78104-04 Blueprint Reading Surveyors**
   a. Describe the types of drawings usually included in a set of plans and list the information found on each type.
   b. Identify the different types of lines used on construction drawings.
   c. Identify selected architectural symbols commonly used to represent materials on plans.
   d. Identify selected electrical, mechanical, and plumbing symbols commonly used on plans.
   e. Identify selected abbreviations commonly used on plans.
   f. Read and interpret plans, elevations, schedules, sections, and details contained in basic construction drawings.
   g. State the purpose of written specifications.
   h. Identify and describe the parts of a specification.
   i. Demonstrate or describe how to perform a quantity takeoff for materials.
   j. Read and interpret orthographic projection and isometric drawings.
   k. Perform a quantity takeoff to determine a concrete quantity.
   l. Calculate rebar required for an identified segment of a drawing.

Standards:

Construction Specifications Institute

Division 34 – Transportation

34 70 00 Transportation Construction and Equipment
34 71 00 Roadway Construction

VALIDATION

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

Description: Basic course dealing with principles of geometry, theory, and use of instruments, mathematical calculations, and the control and reduction of errors.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Measure and record various measurements.
   a. Describe the use of the United States Geological Survey benchmark.
   b. Measure horizontal and vertical angles.
   c. Measure horizontal and vertical distances in English and metric measurements.
   d. Demonstrate differences in elevation between random points.
   e. Record and interpret field notes.
   f. Explain the various duties of each member of a survey party.
2. Use surveying equipment, terms, and signals.
   a. Identify and explain the basic surveying equipment.
   b. Set up the equipment, shoot elevations, and record.

3. Module 78103-04 (Survey Equipment Use and Care One)

   a. Identify, safely use, and properly maintain the tools and instruments commonly used for site layout tasks.
   b. Use a builder's level, transit, or theodolite and differential leveling procedures to determine site and building elevations.
   c. Use accepted practices to record site layout data and information in field notes.
   d. Check and/or establish 90° angles using the 3-4-5 rule.
   e. Turn a 90° angle and double an angle.

Standards:

Manual of Surveying Instructions

Generals Rules (1-20 to 1-21)
Distance Measurement (2-1 to 2-7)
Lettering

VALIDATION

Course Number and Name: **CIT 2113** **Legal Principles of Surveying**

Description: A study of the legal aspects of boundary controls for the survey and resurvey of real property.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply the principles of the legal aspects of surveying.
   a. Define legal terms as used in surveying.
   b. Describe the legal aspects of boundary control.
   c. Prepare survey plats.
   d. Write a legal description of real property.
   e. Research public records for property descriptions.
2. Comply with the minimum standards for land surveying and land surveyor registration requirements set by the State of Mississippi.
   a. Discuss the legal authority and liability of the land surveyor.
   b. Apply Code of Ethics in work situations.
   c. Explain the surveyor's rights, duties, and liabilities.
   d. List the minimum standards for land surveying in Mississippi.
   e. Discuss land surveying registration laws and examinations in Mississippi.

Standards:
Manual of Surveying Instructions

Laws Relating to Surveys (1-16 to 1-19)
Subdivision of Townships (3-47 to 3-73)
Subdivision of Sections (3-74 to 3-92)

VALIDATION

Course Number and Name: **CIT 2124** **Advanced Surveying Practices**

Description: A course designed to provide the student with practical applications of skills and knowledge gained in other surveying and related courses.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	3	2	75
4	2	4	90

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Design and perform the necessary layout of private properties and/or commercial sites according to city, county, state, and/or federal regulations.
   a. Obtain preliminary field data.
   b. Create preliminary design using horizontal curves and cul-de-sacs.
   c. Create a finished design according to specifications.

Standards:
Manual of Surveying Instructions

The Geodesy of Large Scale Cadastral Surveys	(2-74 to 2-83)
Principal Meridian	(3-8 to 3-9)
Base Line	(3-10 to 3-11)
Standard Parallels	(3-12 to 3-13)
Guide Meridians	(3-14 to 3-16)

VALIDATION

Course Number and Name: **CIT 2313** **Soil Mechanics**

Description: Elementary study of exploring, sampling, testing, and evaluating sub-surface materials and their effect on types of foundations and construction.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Index and classify soils.
   a. Define terms used in indexing and classifying of soils.
   b. Describe tests utilized in testing soils.
2. Perform soil tests.
   a. Conduct a plastic limit test.
   b. Conduct a liquid limit test.
   c. Conduct a proctor test.

Standards:

ASTM Standards

D422-63(2002) e1 Standard Test Method for Particle-Size Analysis of Soils, ASTM International

D4318-05 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils, ASTM International

D698-00ae1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3), ASTM International

D1557-02e1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3), ASTM International

Manual of Surveying Instructions

Soil Classification (7-100 to 7-104)

VALIDATION

Course Number and Name: **CIT 2413 Concrete and Hot-Mix Asphalt Testing**

Description: A course which emphasizes standard procedures for sampling, testing, and evaluating materials used in concrete and hot-mix asphalt mixtures.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Sample, test, and evaluate concrete mixtures.
   a. Describe the characteristics and functions of concrete ingredients including additives.
   b. Perform aggregate tests.
   c. Describe properties of fresh concrete.
   d. Proportion concrete mixes.
   e. Describe the procedures for placing and curing of concrete.
   f. Perform strength of concrete tests using concrete cylinders.
   h. Identify and describe concrete construction forms and joints.
2. Sample, test, and evaluate hot-mix asphalt mixtures.
   a. Describe the characteristics and functions of hot-mix asphalt ingredients.
   b. Identify and describe hot-mix design criteria using recycle materials.
   c. Perform mineral aggregate tests for hot-mix asphalt mixtures.
   d. Perform the Marshall test for hot-mix asphalt or an alternative super pave test.
   e. Identify and explain the hot-mix asphalt manufacturing procedures.
   f. Identify and explain the hot-mix asphalt paving procedures.

Standards:
ASTM Standards

1188-96(2002) e1 Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens, ASTM International

C143/C143M-05a Standard Test Method for Slump of Hydraulic Cement Concrete, ASTM International

C39/C39M-05e1 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens, ASTM International

VALIDATION

Course Number and Name: **CIT 2423** **Mapping and Topography**

Description: Selected drafting techniques are applied to the problem of making maps, traverses, plot plans, plan drawings, and profile drawings using maps, field survey data, aerial photographs, and related references and materials including symbols, notations, and other applicable standardized materials.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Plan and draw a map.
   a. Explain and draw a plan and profile.
   b. Define the various maps and symbols used in mapping.
   c. Prepare a contour map.
2. Transform field notes into engineering drawings.
   a. Explain an engineering drawing.
   b. Determine the correct scale size.
   c. Explain what information is needed from the field notes to complete a drawing.
   d. Complete a drawing from field notes.

Standards:

American Drafting and Design Association

DDS1 General Drafting Terminology
DDS2 View Identification
DDS3 Dimensioning Standards & Terminology
DDS5 Orthographic Projections Standards & Terminology
DDS8 Pictorial View Standards & Terminology

Manual of Surveying Instructions

Topography (9-41 to 9-51)
Field Sketch (9-52 to 9-56)

VALIDATION

Course Number and Name: **CIT 2433** **Land Surveying**

Description: This course teaches aspects of boundary controls, principles for land surveying, methods of land boundary location, and land description in accordance with original surveys and resurveys.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explore the history of the U.S. public land surveying system.
   a. Discuss the establishment of initial points.
   b. Explain the method of laying out townships, ranges, and sections.
   c. Discuss reestablishing section corners with single and double proportion methods.
   d. Explain the principle of convergence of meridians.
2. Make and record measurements.
   a. Chain a distance, record measurements, and make pertinent notes.
   b. Complete a level traverse circuit, record, and plot data.
   c. Read angular measurements and record data.
   d. Run a traverse requiring elevations, traverse points, and locations of major details.
3. Compute survey data.
   a. Compute horizontal curve from established data.
   b. Determine traverse computations.
   c. Calculate distances in a specified geographical area from field notes using appropriate geometric principles.
4. Complete a given survey.
   a. Survey a given area.
   b. Resurvey a given area to determine accuracy.
   c. Subdivide property using total stations and data collector.

5. Module 78102-04 (Surveying Math)

   a. Solve basic equations, including those involving squares and square roots.
   b. Identify basic geometric shapes and angles.
   c. Apply the Pythagorean theorem to solve math problems involving right triangles.
   d. Perform decimal and metric conversions for linear measures, areas, and volumes.

Standards:
Manual of Surveying Instructions

The Public Lands (1-9 to 1-15)
Public Land States (1-23)
Initial Points (3-6 to 3-7)

VALIDATION

Course Number and Name: **CIT 2443** **GPS Surveying**

Description: This course teaches principles of surveying utilizing artificial earth orbit satellites.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Use GPS equipment.
   a. Define terminology.
   b. Transfer data between engineering software systems.
2. Define and utilize data generated by GPS.
   a. Define how GPS is specifically designed for spatial analysis to fully analyze geographic data.
   b. Define GPS used in federal and state government, utilities, private engineering consulting firms, and corporations.

Standards:
Manual of Surveying Instructions

Distance Measurement	(2-1 to 2-7)
The Direction of Lines	(2-17 to 2-52)
The Direction of Lines	(2-53 to 2-73)
Purpose and Style	(8-1 to 8-6)

VALIDATION

Course Number and Name: **CIT 2453** **Fundamentals of Geographical Information Systems (GIS)**

Description: This course includes the use of computer mapping and databases in multiple applications. Included is incorporation of imagery and data into a graphical oriented database system. Also included are the fundamentals of geographical information systems techniques, approaches, and applications.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify the basic components of a geographical information system.
   a. Identify and define a geographical information system.
   b. Describe how GIS is used to collect, analyze, and present data.
2. Explore careers in GIS.
   a. Describe GIS use in public and private agencies.
   b. Describe and compare the duties of GIS manager, GIS database manager, cartographer, and GIS technician.
3. Perform basic operations and procedures using GIS software.
   a. Define themes and layers, attributes, and other terms related to GIS.
   b. Define and compare vector data versus raster data.
   c. Create vector data using raster data.

Standards:

American Drafting Design Association

DDS10 Computer/CADD Terminology

VALIDATION

Course Number and Name: **CIT 2523** **Hydraulic Design**

Description: A study of the hydrological principles in the distribution and movement of water on and under the earth's surface and in water distribution systems.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45
3	2	2	60
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Describe water wells.
   a. Identify and describe basic hydraulic and hydrological terms.
   b. Describe the standards which determine where water wells or water distribution sources are located, designed, or constructed.
2. Calculate various hydrological units.
   a. Calculate pressure-velocity-head relationships.
   b. Calculate gravity flow in pipes.
   c. Calculate flow in pipes under pressure.
   d. Calculate flow in pipe networks.
3. Determine various hydrological events.
   a. Distinguish between natural and man-made hydrological cycles.
   b. Describe the relationship among rainfall, surface water, and water availability.
   c. Estimate surface water or storm runoff.
   d. Explain the relationship between droughts and reservoirs.
   e. Describe the principles of groundwater flow.

Standards:

Mississippi Department of Environmental Quality: Mississippi Water Well Contractors License

MWW1 Capabilities of Rigs used in MS
MWW2 Documentation for MS Regulations
MWW5 Geology/Hydrology of MS
MWW7 Operation of Drill Equipment
MWW8 Regulatory Issues for MS
MWW9 Selection of Materials Troubleshooting
MWW11 Well Development

VALIDATION

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

Description: A course designed to provide the student with practical application of skills and knowledge gained in other Civil Engineering Technology courses. The instructor works closely with the student to insure that the selection of a project will enhance the student's learning experience.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1-3	0	2-6	30-90

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Develop a written plan which details the activities and projects to be completed.
   a. Utilize a written plan which 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 daily written assessment of accomplishment of objectives.
   b. Present weekly written reports to instructor in activities performed and objectives accomplished.
3. Utilize a set of written guidelines for the special project.
   a. Develop a set of written guidelines for the special project.
   b. Follow the guidelines throughout the project development.

VALIDATION

Course Number and Name: **CIT 292(1-6) Supervised Work Experience in Civil Engineering Technology**

Description: A course which is a cooperative program between industry and education and is designed to integrate the student's technical studies with industrial experience. Variable credit is awarded on the basis of one semester hour per 45 industrial contact hours.

Hour Breakdown:

Semester Credit Hours	Lecture	Externship	Contact Hours
1-6	0	3-18	45-270

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply technical skills needed to be a viable member of the workforce.
   a. Prepare a description of technical skills to be developed in the supervised work experience.
   b. Develop technical skills needed to be a viable member of the workforce.
2. Apply skills developed in other program area courses.
   a. Perform skills developed in other program area courses.
3. Apply human relationship skills.
   a. Use proactive human relationship skills in the supervised work experience.
4. Apply and practice positive work habits and responsibilities.
   a. Perform assignments to develop work habits and responsibilities.
5. Work with instructor and employer to develop written occupational objectives to be accomplished.
   a. Perform written occupational objectives in the supervised work experience.
6. Assess accomplishment of objectives.
   a. Prepare daily written assessment of accomplishment of objectives.
   b. Present weekly written reports to instructor in activities performed and objectives accomplished.
7. Utilize a set of written guidelines for the supervised work experience.
   a. Develop and follow a set of written guidelines for the supervised work experience.

APPENDIX A: RECOMMENDED TOOLS AND EQUIPMENT

CAPITALIZED ITEMS

1. CAD stations with current release surveying and civil engineering software (20)
2. Plotters (2)
3. Flat files (30 drawers)
4. CAD station desk with chairs (20)
5. Total station with data collector, software, and accessories (1 per 4 students)
6. Robotic Total Station System and appropriate accessories (1)
7. Land leveling laser system and accessories (1)
8. GPS base station with software including data collector (1 per 4 students)
9. Levels with tripods and elevation rods both in English and metric units (1 per 4 students)
10. UAV/UAS (Drones) with software included (1 per 5 students)

NON-CAPITALIZED ITEMS

1. Inkjet/Laser printers (5)
2. Paper cutters (2)
3. GPS hand-held receiver (1 per 4 students)
4. Surveying accessories, prism pole with prisms, 25 ft. tapes in both English and metric units (2 per total station)
5. Hammers (2 pound) (1 per 4 students)
6. Two-way radio (1 per student)
7. Plumb bobs with sheath and string (2 per student)
8. 100 ft. reel engineer's tape (2)
9. 66 ft. Gunter's chain (2)
10. 100 ft. engineer's rope (2)
11. 100 ft. engineer's tape (2)
12. Sets of surveyor arrows with holders (10)
13. Roto-tape in English units (1)
14. Roto-tape in metric units (1)
15. Time-cube radio (for WWV time) (1)
16. Bush axe (2)
17. Bush blades (2)
18. Metal detector (1)
19. Calculator (1 per student)

ASPHALT

CAPITALIZED ITEMS

1. Bench ovens (2)
2. Large floor oven (1)
3. Bench mixer with asphalt attachments (1)
4. Sieve master sieve shaker (2)
5. Water bath (1)
6. 4 ft. x 12 ft. lab tables with chemistry comparable tops, base and top (9)
7. Gyratory Compactor (1)

NON-CAPITALIZED ITEMS

1. Set of coarse sieves (1)
2. Set of fine sieves (1)
3. Hot plates (2)
4. Specific gravity set (1)
5. Vacuum pump (1)

SOILS

CAPITALIZED ITEMS

1. Standard soils testing oven (1)

NON-CAPITALIZED ITEMS

1. Liquid limit device set (1 per 2 students)
2. Plastic limit set (1 per 2 students)
3. Proctor set (1 per student)
4. Sand cone set (1 per student)
5. Specific gravity set (1 per student)
6. Microwave oven (1)

CONCRETE

CAPITALIZED ITEMS

1. Laboratory concrete mixer (1)
2. Concrete cylinder compression machine (1)
3. Concrete air meter and yield test set with strike plate (1)
4. Curing tank with heater for concrete cylinders (1)
5. AASHTO and ASTM standards (1 set each)
6. Air compressor, 22 hp (1)

NON-CAPITALIZED ITEMS

1. Specific gravity set for fine (1 per student)
2. Specific gravity set for coarse (1 per student)
3. Metal storage cabinet (1)
4. Capping sets (2)
5. Stop watches (2)
6. Laboratory vibrator (1)
7. Concrete cylinder micrometer (1)
8. Slump cone testing set (1 per 4 students)
9. Roll-a-meter (2)
10. Concrete thermometer (1 per student)

VALIDATION

RECOMMENDED INSTRUCTIONAL AIDS

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

1. Laptop computer (1)
2. Computer with operating software with multimedia kit (1)
3. Data projector (1)
4. VCR/DVD Player(1)
5. TV
6. Smart Board
7. Overhead projector

APPENDIX B: STANDARDS FOR CIVIL ENGINEERING TECHNOLOGY

Manual of Surveying Instructions from the Bureau of Land Management

Chapter I – The General Plan

The Manual	(1-1 to 1-8)
The Public Lands	(1-9 to 1-15)
Laws Relating to Surveys	(1-16 to 1-19)
Generals Rules	(1-20 to 1-21)
Organization	(1-22)
Public Land States	(1-23)

Chapter II – Methods of Survey

Distance Measurement	(2-1 to 2-7)
Photogrammetry	(2-8 to 2-16)
The Direction of Lines	(2-17 to 2-52)
The Direction of Lines	(2-53 to 2-73)
The Geodesy of Large Scale Cadastral Surveys	(2-74 to 2-83)

Chapter III – The System of Rectangular Surveys

General Scheme	(3-2 to 3-5)
Initial Points	(3-6 to 3-7)
Principal Meridian	(3-8 to 3-9)
Base Line	(3-10 to 3-11)
Standard Parallels	(3-12 to 3-13)
Guide Meridians	(3-14 to 3-16)
Township Exteriors	(3-17 to 3-46)
Subdivision of Townships	(3-47 to 3-73)
Subdivision of Sections	(3-74 to 3-92)
Fractional Townships	(3-97 to 3-99)
Extensional Completion Surveys	(3-100 to 3-114)
Meandering	(3-115 to 3-123)
Limits of Closure	(3-124)
Marking Lines Between Corners	(3-125)
Summary of Objects to be Noted	(3-126)

Chapter IV – Monumentation

Legal Significance of the Monument	(4-2 to 4-3)
General Requirements	(4-4 to 4-6)
Corner Material	(4-7 to 4-8)
Construction of Monuments	(4-9 to 4-14)
Special-Purpose Monuments	(4-15 to 4-19)
System of Marking	(4-20 to 4-22)
Marks on Corner Monuments	(4-23 to 4-81)
Marks on Specials-Purpose Monuments	(4-82)
Corner Accessories	(4-83 to4-96)
Arrangement and Marking of Corner Acc.	(4-97 to 4-114)

Chapter V – Restoration of Lost – Obliterated Corners	**(5-1 to 5-3)**
Identification of Existent Corners	(5-4 to 5-19)
The Restoration of Lost Corners	(5-20 to 5-47)

Topography	(10-39
Field Notes and Preliminary Plat	(10-40 to 10-47)
Amended Surveys	(10-61 to10-63)
Plats	(10-64 to10-65)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) STANDARDS

D422-63(2002) e1 Standard Test Method for Particle-Size Analysis of Soils, ASTM International

D4318-05 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils, ASTM International

D698-00ae1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort [12,400 ft-lbf/ft^3 (600 kN-m/m^3)], ASTM International

D1557-02e1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3(2,700 kN-m/m^3)) , ASTM International

D1188-96(2002)e1 Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens, ASTM International

C143/C143M-05a Standard Test Method for Slump of Hydraulic Cement Concrete, ASTM International

C39/C39M-05e1 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens, ASTM International

Construction Specifications Institute
Division 34 – Transportation

34 70 00 Transportation Construction and Equipment
34 71 00 Roadway Construction

Mississippi Department of Environmental Quality
Mississippi Water Well Contractors License

MWW1	Capabilities of Rigs used in MS
MWW2	Documentation for MS Regulations
MWW3	Drill Bit Selection for MS formations
MWW4	Fluid Selection
MWW5	Geology/Hydrology of MS
MWW6	Grouting Regulations for MS
MWW7	Operation of Drill Equipment
MWW8	Regulatory Issues for MS
MWW9	Selection of Materials Troubleshooting
MWW10	Understanding Drill Equipment
MWW11	Well Development

American Design Drafting Association

DDS1 General Drafting Terminology
DDS2 View Identification
DDS3 Dimensioning Standards & Terminology
DDS4 Sections View Standards & Terminology
DDS5 Orthographic Projections Standards & Terminology
DDS6 General Drafting Standards
DDS7 Manufacturing Processes & Welding
DDS8 Pictorial View Standards & Terminology
DDS9 Auxiliary View Standards, Definitions & Terminology
DDS10 Computer/CADD Terminology

APPENDIX C: 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:

    - 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 D: Course Crosswalk

COURSE CROSSWALK Civil Engineering Technology (CIP: 15.0201)					
Note: Courses that have been added or changed in the 2018 curriculum are highlighted.					
Existing			**Revised**		
2011 MS Curriculum Framework			**2018 MS Curriculum Framework**		
Course Number	**Course Title**	**Hours**	**Course Number**	**Course Title**	**Hours**
			CIT 1133	Introduction to Craft Skills	3
CIT 1114	Route Surveying	4	CIT 1113	Route Surveying	3
CIT 1213	Road Design and Construction Methods and Materials	3	CIT 1213	Civil Construction Methods and Materials	3
CIT 1223	Road Construction Plans and Specifications	3	CIT 1223	Construction Plans and Specifications	3
CIT 1413	Elementary Surveying	3	CIT 1413	Elementary Surveying	3
CIT 2113	Legal Principles of Surveying	3	CIT 2113	Legal Principles of Surveying	3
CIT 2124	Advanced Surveying Practices	4	CIT 2124	Advanced Surveying Practices	4
CIT 2313	Soil Mechanics	3	CIT 2313	Soil Mechanics	3
CIT 2413	Concrete and Hot Mix Asphalt Testing	3	CIT 2413	Concrete and Hot Mix Asphalt Testing	3
CIT 2423	Mapping and Topography	3	CIT 2423	Mapping and Topography	3
CIT 2434	Land Surveying	4	CIT 2433	Land Surveying	3
CIT 2443	GPS Surveying	3	CIT 2443	GPS Surveying	3
CIT 2453	Fundamentals of Geographical Information Systems (GIS)	3	CIT 2453	Fundamentals of Geographical Information Systems (GIS)	3
CIT 2513	Water and Water Distribution	3	CIT 2523	Hydraulic Design	3
CIT 291(1-3)	Special Project	1-3	CIT 291(1-3)	Special Project	1-3
CIT 292(1-6)	Supervised Work Experience in Civil Engineering Technology	1-6	CIT 292(1-6)	Supervised Work Experience in Civil Engineering Technology	1-6