Maritime Pipefitting Technology
Mississippi Curriculum Framework

Program CIP: 46.0502 – Pipefitting/Pipefitter and Sprinkler Fitter.

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ADOPTION OF NATIONAL CERTIFICATION STANDARDS

The National Center for Construction Education and Research (NCCER) a not-for-profit 501(c)(3) education foundation created in 1996. 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 curricula and assessments with portable credentials. These credentials are tracked through NCCER's National Registry which allows organizations and companies to track the qualifications of their craft professionals and/or check the qualifications of possible new hires. The National Registry also assists craft professionals by maintaining their records in a secure database.

NCCER's process of accreditation, instructor certification, standardized curriculum, national 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. NCCER is headquartered in Alachua, Fla., and is affiliated with the University of Florida's M.E. Rinker, Sr. School of Building Construction.

The goal is to prepare graduates to complete Level 1 – 2 of the NCCER Maritime Pipefitting Credentials as well as selected modules from the Level 3 – 4 NCCER Pipefitting Credentials.

As the accrediting body for the industry, NCCER establishes the benchmark for quality training and assessments. By partnering with industry and academia, NCCER has developed a system for program accreditation that is similar to those found in institutions of higher learning. This process fosters national unity among the construction industry while providing a defined career path with industry-recognized credentials.

NCCER's accreditation process assures that students and craft professionals receive quality training based on uniform standards and criteria. These standards are outlined in the NCCER Accreditation Guidelines and must be adhered to by all NCCER Accredited Training Sponsors and Accredited Assessment Centers.

For more information related to implementing NCCER at your local campus, please contact visit http://mcef.net/.

INDUSTRY JOB PROJECTION DATA

Plumbers, pipefitters, and steamfitter occupations require an education level of a long term on the job training. There is an 18.73% increase in occupational demand at the regional level and a 14.985% increase at the state level. Median annual income for plumbers, pipefitters, and steamfitters is $35,235.20 at the state and regional level. A summary of occupational data from the State Workforce Investment Board Data Center is displayed below.

Table 1: Education Level

Program Occupations	Education Level
Plumbers, pipefitters, and steamfitters	Long-Term on-the-job training

Table 2: Occupational Overview

	Region	State	United States
2010 Occupational Jobs	2749	3345	358420
2020 Occupational Jobs	3264	3846	417960
Total Change	515	501	59540
Total % Change	18.73%	14.98%	16.61%
2010 Median Hourly Earnings	$16.94	$16.94	$22.43
2010 Median Annual Earnings	$35,235.20	$35,235.20	$46,654.40
Annual Openings	51	50	5954

Table 3: Occupational Breakdown

Description	2010 Jobs	2020 Jobs	Annual Openings	2010 Hourly Earnings	2010 Annual Earnings 2,080 Work Hours
Plumbers, pipefitters, and steamfitters	2749	3264	51	$16.94	$35,235.20
TOTAL	2749	3264	51	$16.94	$35,235.20

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
Plumbers, pipefitters, and steamfitters	515	18.73%	14.98%	16.61%

ARTICULATION

Articulation credit from Secondary Career Pathway programs to Postsecondary Industrial Maintenance is available. Secondary students who have completed the articulated the Secondary Career Pathway Courses listed below may be awarded articulated college credit according to Mississippi Community College Board (MCCB) guidelines (http://www.mccb.edu/pdfs/ct/StatewideArtManual201213.pdf).

Articulated Secondary Course	**Articulated Postsecondary Course**	**Aligned Industry Certification**
Construction: Carpentry Concentration CIP 46.0000	CTE1143 – Fundamentals of Construction and Manufacturing	NCCER Core Curriculum

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:

1. NCCER Core Assessment
   Specifications: http://www.nccer.org/uploads/fileLibrary/Core_V2_Specs.pdf
2. NCCER Maritime Pipefitting Level 1 and 2 Credential

OR

1. MS-CPAS2

PROGRAM DESCRIPTION

The Marine Pipefitting program prepares individuals for a variety of entry-level positions in the marine/industrial setting. Plumbers, pipefitters, and steamfitters install and repair pipes that carry liquids or gases to and in businesses, homes, and factories. Plumbers, pipefitters, and steamfitters typically do the following:

- Install pipes and fixtures
- Study blueprints and follow state and local building codes
- Determine the amount of material and type of equipment needed
- Inspect and test installed pipe systems and pipelines
- Troubleshoot systems that are not working
- Replace worn parts

The goal is to prepare graduates to complete Level 1 – 2 of the NCCER Maritime Pipefitting Credentials as well as selected modules from the Level 3 – 4 NCCER Pipefitting Credentials.

SUGGESTED COURSE SEQUENCE

Career Certificate Required Courses

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Clock Hours	Lecture	Lab	Certification Name
CTE 1143	Fundamentals of Construction and Manufacturing	3	2	2	60	30	30	NCCER Core Curriculum
MPT 1112	Introduction to Maritime Pipefitting	2	2		30	30	0	
MPT 1121	Principles of Pipefitting Math	1	1		15	15	0	
MPT 1133	Pipefitting Tools and Equipment	3	2	2	60	30	30	
MPT 1142	Pipefitting Systems and Drawings	2	1	2	45	15	30	
MPT 1212	Oxyfuel Cutting and Brazing	2	1	2	45	15	30	NCCER Maritime Pipefitting Level I
MPT 1152	Rigging Equipment and Practices	2	1	2	45	15	30	
MPT 1162	Advanced Piping Math	2	2		30	30	0	
MPT 1222	Butt Weld Pipe Fabrication	2	1	2	45	15	30	
MPT 1232	Socket Weld Pipe Fabrication	2	1	2	45	15	30	
MPT 1241	Threaded Pipe Fabrication	1	1		15	15	0	
MPT 1311	Fiberglass and Plastic Pipe	1	1		15	15	0	
MPT 1322	Identifying Valves, Flanges, and Gaskets	2	1	2	45	15	30	NCCER Maritime Pipefitting Level II
MPT 2173	Advanced Pipe Drawing (Intermediate and Advanced)	3	3		45	45	0	
MPT 1342	Routing Trimming and Testing Piping Systems	2	1	2	45	15	30	
	TOTAL	**30**	**22**	**16**	**570**	**330**	**240**	

Technical Certificate Required Courses

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Clock Hours	Lecture	Lab	Certification Name
MPT 1333	Pipe Installation with Hangers and Supports	3	1	4	75	15	60	
MPT 2181	In-line Specialties, Standards, and Specifications	1	1		15	15	0	
MPT 2253	Advanced Pipe Fabrication	3	1	4	75	15	60	
MPT 2511	Stress Relieving and Aligning	1	1		15	15	0	
MPT 2521	Steam Traps	1	1		15	15	0	
MPT 2532	Special Piping	2	1	2	45	15	30	
MPT 2541	Maintaining Valves	1	1		15	15	0	
MPT 2613	Fundamentals of Leadership	3	3		45	45	0	
	TOTAL	**15**			**225**	**135**	**90**	

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.

[1] 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/2012PrinciplesOfAcreditation.pdf

Technical Electives

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Clock Hours	Lecture	Lab	Certification Name
	Other Instructor Approved Electives	0			0	0	0	

CAREER CERTIFICATE REQUIRED COURSES

Course Number and Name: **CTE 1143 Industrial Maintenance Core Curriculum**

Classification: Career Certificate Core Requirement

Description: This course includes basic safety, introduction to construction math, introduction to hand and power tools, blueprint drawings, and employability and communications. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	60

National Assessment: NCCER Core Curriculum Credential

Prerequisite: None

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--Introduction to Hand Tools

1. Recognize and identify some of the basic hand tools and their proper uses in the construction trade.
2. Visually inspect hand tools to determine if they are safe to use.
3. Safely use hand tools.

Module 00104-09--Introduction to 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--Introduction to 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 workplace issues such as sexual harassment, stress, and substance abuse.

Module 00109-09--Introduction to Materials Handling

1. Define a 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.

Course Number and Name: **MPT 1112 Introduction to Maritime Pipefitting**

Classification: Career Certificate Core Requirement

Description: This course provides the trainee with an overview of pipefitting, pipefitter responsibilities, and career opportunities. The course also covers basic principles of safety.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
2	2	0	30

National Assessment: NCCER Core Curriculum Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 85101-13 Orientation to the Maritime Pipefitting Trade

1. Identify the types of work that a maritime pipefitter does and the characteristics required for success.
2. Explain the basic structure of an apprentice training program and identify career opportunities available to maritime pipefitters.
3. Describe the importance of safety and basic safety guidelines related to maritime pipefitting.

Course Number and Name: **MPT 1121 Principles of Pipefitting Math**

Classification: Career Certificate Core Requirement

Description: This course explains how to use ratios and proportions, solve basic algebra, area, volume, and circumference problems, and solve for right triangles using the Pythagorean Theorem. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
1	1	0	15

National Assessment: Selected Module of NCCER Maritime Pipefitting Level I Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 85102-13 Maritime Pipefitting Trade Math

1. Identify and explain the use of measuring devices used with scale drawings.
2. Explain how to calculate piping offsets various ways, including using the Pythagorean theorem.
3. Use conversion tables of weights, measurement, and volume.
4. Use formulas to solve basic problems.
5. Solve mathematical problems related to the following:
   - Area
   - Volume
   - Circumference

Course Number and Name: **MPT 1133 Pipefitting Tools and Equipment**

Classification: Career Certificate Core Requirement

Description: This course covers general hand tool safety and procedures for identifying, selecting, inspecting, using, and caring for pipe vises and stands, pipe wrenches, levels, pipe fabrication tools, and pipe bending tools. This course identifies the hazards and explains general safety procedures that must be followed when using power tools, and explains specific guidelines for using electric and pneumatic power tools. This course explains the applications, proper use, and safety considerations for using engine-driven generators, welding machines, air compressors, pumps, forklift trucks, and hydraulic cranes. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
3	2	2	60

National Assessment: Selected Module of NCCER Maritime Pipefitting Level I Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 85103-13 Pipefitting Hand Tools

1. Describe the safety requirements that apply to the use of pipefitter hand tools.
2. Explain how to properly care for selected pipefitter hand tools.
3. Explain how to safely and properly use selected pipefitter hand tools.
4. Identify tools and state their uses.

Performance Tasks

Under the supervision of the instructor, students should be able to complete the following:

1. Identify various pipefitting hand tools.
2. Secure a section of pipe in a vise and pipe stand.
3. Properly use the following:
    - Straight pipe wrenches
    - Offset pipe wrenches
    - Chain wrenches
    - Strap wrenches
    - Laser level
    - Torpedo and larger levels
    - Tubing water level

- Center finder
- Manual pipe threading tools

4. Check square and level:
    - Turn tongue 180 degrees from where it was.
    - Flip level to ensure it is level.

Module 85104-13 Pipefitting Power Tools

1. State the safety and visual inspection procedures to be followed when working with power tools.
2. Identify and explain how to use portable grinders and saws.
3. Explain how to operate and maintain pipe threading equipment.
4. Describe various pipe beveling processes and identify the equipment used in pipe beveling.

Performance Tasks

Under the supervision of the instructor, students should be able to complete the following:

1. Cut pipe using a portable band saw.
2. Cut pipe using a portable grinder.
3. Bevel a pipe using a portable grinder.
4. Replace the dies in a threading machine.
5. Cut, ream, and thread pipe using a threading machine.
6. Cut and thread nipples using a nipple chuck.
7. Thread pipe using a portable power drive.

Course Number and Name: **MPT 1142 Pipefitting Systems and Drawings**

Classification: Career Certificate Core Requirement

Description: This course introduces chemical, compressed air, fuel oil, steam, and water systems and explains how to identify them by color-code. It also explains thermal expansion of pipes and pipe insulation. This course introduces the trainee to plot plans, structural drawings, elevation drawings, as-built drawings, equipment arrangement drawings, P&IDs, isometric drawings, spool sheets, and detail sheets. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
2	1	1	30

National Assessment: Selected Module of NCCER Maritime Pipefitting Level II Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 85208-13 Drawing and Detail Systems

1. Identify and explain the types of piping systems used in maritime applications and the methods used to identify them.
2. Describe the types of pipe used in maritime systems, how they are used, and how they are sized.
3. Explain the effects and corrective measures for thermal expansion and heat loss in piping systems.

Performance Tasks

Under the supervision of the instructor, students should be able to complete the following:

1. Identify the type of piping system designed by color codes.
2. Identify piping systems by material.
3. Identify pipe schedules by pipe.

Course Number and Name: **MPT 1212 Oxyfuel Cutting and Brazing**

Classification: Career Certificate Core Requirement

Description: This course explains the safety requirements for oxyfuel cutting. It identifies oxyfuel cutting equipment and setup requirements. It explains how to light, adjust, and shut down oxyfuel equipment. Trainees will perform cutting techniques that include straight line, piercing, bevels, and washing. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
2	1	2	45

National Assessment: Selected Module of NCCER Maritime Pipefitting Level I Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 85105-13 Oxyfuel Cutting *(Maritime Level 1)*

1. Identify the safety equipment and procedures required for oxyfuel cutting.
2. Identify and explain the use of oxyfuel cutting equipment.
3. Explain how to set up, operate, and shut down oxyfuel equipment.
4. Describe the characteristics of oxyfuel tanks and manifolds.
5. Explain how to perform various oxyfuel cutting procedures.

Performance Tasks: Under the supervision of the instructor, students should be able to complete the following:

1. Set up oxyfuel equipment.
2. Properly light and adjust an oxyfuel cutting torch.
3. Properly shut down oxyfuel cutting equipment.
4. Change empty cylinders.
5. Use an oxyfuel bevel cutting machine to bevel a pipe.
6. Perform washing.
7. Perform gouging.

Module 85204-13 Brazing *(Maritime Level 2)*

1. Identify the tools and materials used to braze cooper and other metals.
2. Describe how to prepare pipe ends for brazing.
3. Describe the materials and methods used to braze piping made of cooper and other metals including stainless steel, brass, cupronickel, nickel-copper, valve bronze, and Inconel.

Performance Tasks: Under the supervision of the instructor, students should be able to complete the following:

1. Properly prepare copper or cupronickel pipe and fittings for brazing.

Course Number and Name: **MPT 1152 Rigging Equipment and Practices**

Classification: Career Certificate Core Requirement

Description: This course describes the use and inspection of the basic equipment and hardware used in rigging, including slings, wire ropes, chains, and attaching hardware. It also explains sling angles and describes the use of tuggers, jacks, hoists, and come-alongs. This course describes basic rigging and crane hazards and related safety procedures, provides an overview of personnel lift lifting and lift planning, and introduces load charts and load balancing. It includes instructions for rigging and lifting pipe. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
2	1	2	45

National Assessment: Selected Module of NCCER Maritime Pipefitting Level I Credential

Student Learning Outcomes:

Module 85106-13 Rigging Equipment and Practices

1. Identify the different types of ladders and scaffolding used on a work site.
2. Describe how to safely use ladders and scaffolding.

Performance Tasks

Under the supervision of the instructor, students should be able to complete the following:

1. Select, inspect, and use stepladders.
2. Select, inspect, and use extension ladders.
3. Properly inspect scaffolding.

Course Number and Name: **MPT 1162 Advanced Piping Math**

Classification: Career Certificate Core Requirement

Description: This course discusses the use of equivalent and conversion tables and explains how to use right angle trigonometry to calculate takeouts. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
2	2	0	30

National Assessment: Selected Module of NCCER Pipefitting Level 3 Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 08304-07 Advanced Trade Math

1. Use tables of equivalents.
2. Perform right angle trigonometry.
3. Calculate takeouts using trigonometry

Course Number and Name: **MPT 1222 Butt Weld Pipe Fabrication**

Classification: Career Certificate Core Requirement

Description: This module describes the materials used in butt weld piping systems. It explains how to determine pipe lengths between butt weld fittings, prepare the pipe and fittings for fit-up, and fabricate butt weld fittings. It also describes how to select and install backing rings, fabricate channel iron welding jigs, and use and care for welding clamps. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
2	1	2	45

National Assessment: Selected Module of NCCER Maritime Pipefitting Level II Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 85202-13 Butt Weld Pipe Fabrication

1. Identify butt weld fittings.
2. Explain how to read and interpret butt weld piping drawings.
3. Describe how to properly prepare pipe ends for fit-ups.
4. Explain how to determine pipe length between fittings for butt weld applications.
5. Describe the proper alignment procedures for various types of fittings.

Performance Tasks

Under the supervision of the instructor, students should be able to complete the following:

1. Prepare pipe ends for fit-up.
2. Install backing rings.
3. Align pipe to both ends of various types of fittings, including flanges and ells.

Course Number and Name: **MPT 1232 Socket Weld Pipe Fabrication**

Classification: Career Certificate Core Requirement

Description: This module describes the materials used in socket weld piping systems. It explains how to determine pipe lengths between socket weld fittings, prepare the pipe and fittings for fit-up, and fabricate socket weld fittings. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
2	1	2	45

National Assessment: Selected Module of NCCER Maritime Pipefitting Level II Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 85203-13 Socket Weld Pipe Fabrication

1. Identify and explain socket weld fittings.
2. Read and interpret socket weld piping drawings.
3. Determine pipe lengths between socket weld fittings.
4. Describe how to fabricate socket weld fittings to pipe.

Performance Tasks

Under the supervision of the instructor, students should be able to complete the following:

1. Calculate pipe lengths from line drawing using the center –to-center method, the center-to-face method, and the face-to-face method.
2. Align socket weld elbow to the end of a pipe.
3. Align pipe to various types of fittings, to include two fittings on one pie such as flanges and ells.

Course Number and Name: **MPT 1241 Threaded Pipe Fabrication**

Classification: Career Certificate Core Requirement

Description: This course describes the materials used in threaded piping systems. It explains how to determine pipe lengths between threaded pipe fittings, prepare the pipe and fittings for fit-up, and assemble the piping system. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
1	1	0	15

National Assessment: Selected Module of NCCER Maritime Pipefitting Level II Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 85205-13 Threaded Pipe Fabrication

1. Identify and describe characteristics of pipe threads and fittings.
2. Calculate pipe lengths between threaded joints.
3. Describe how to thread and assemble threaded pipe and fittings.

Performance Tasks: Under the supervision of the instructor, students should be able to complete the following:

1. Determine pipe lengths between fittings using the center-to-center method.
2. Determine pipe lengths between fittings using the center-to-face method.
3. Determine pipe lengths between fittings using the face-to-face method.
4. Assemble threaded pipe using various fittings.

Course Number and Name: **MPT 1311 Fiberglass and Plastic Pipe**

Classification: Career Certificate Core Requirement

Description: This module introduces students to piping using fiberglass and plastic as the primary piping material. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
1	1	0	15

National Assessment: Selected Module of NCCER Maritime Pipefitting Level II Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 85206-13 Fiberglass and Plastic Pipe

1. Identify the types, sizes, and assembly methods for fiberglass pipe and fittings.
2. Identify the types, sizes, and assembly methods for plastic pipe fittings.

Performance Tasks: Under the supervision of the instructor, students should be able to complete the following:

1. Properly measure, cut, and join plastic piping.

Course Number and Name: **MPT 1322 Identifying Valves, Flanges, and Gaskets**

Classification: Career Certificate Core Requirement

Description: This module identifies and provides installation methods for different types of valves. It also covers valve storage and handling. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
2	1	2	45

National Assessment: Selected Module of NCCER Maritime Pipefitting Level II Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 85206-13 Fiberglass and Plastic Pipe

1. Identify various types of valves based on their primary functions.
2. Identify types of valve actuators.
3. Describe factors related to the selection, storage, and handling of valves.
4. Identify and describe various types of flanges and gaskets.

Course Number and Name: **MPT 2173 Advanced Pipe Drawing (Intermediate and Advanced)**

Classification: Technical Certificate Core Requirement

Description: This module covers P&IDs, plan views, section views, isometric drawings, and spool drawings. It teaches the trainee to work through a set of drawings and extract the information from one drawing that is necessary to interpret other drawings. It explains how to use plan views to draw isometrics and use isometrics to put together spools. The drawings supplied fit together to design a main steam line for a power plant. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
3	3	0	45

National Assessment: Selected Module of NCCER Maritime Pipefitting Level II Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 85208-13 Drawings and Detail Sheets

1. Identify parts of drawings.
2. Identify types of drawings.
3. Identify drawings used by maritime pipefitters.

Performance Tasks: Under the supervision of the instructor, students should be able to complete the following:

1. Sketch basic orthographic and isometric piping sections.
2. Identify types of drawings and parts of drawing.

Course Number and Name: **MPT 1342 Routing Trimming and Testing Piping Systems**

Classification: Career Certificate Core Requirement

Description: This module explains how to secure the work area and determine field run specifications, load weights for erection equipment, and support needs. It also covers how to erect vessel trim. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
2	1	2	45

National Assessment: Selected Module of NCCER Pipefitting Level III Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 08307-07 Field Routing and Vessel Trim

1. Secure the work area.
2. Determine field run specifications.
3. Determine the required rigging equipment based on weight, location, and configuration.
4. Determine the load weight for erection equipment.
5. Determine support needs.
6. Select and install erection materials.
7. Fabricate the field run of pipe.
8. Erect vessel trim.

Performance Task
Under the supervision of the instructor, students should be able to complete the following:

1. Determine spool specifications for field-routing activities.
2. Determine the load weight for erection equipment.
3. Install test blinds.
4. Install temporary hydrotest spools.
5. Identify vessel trim.

TECHNICAL CERTIFICATE REQUIRED COURSES

Course Number and Name: **MPT 1333 Pipe Installation with Hangers and Supports**

Classification: Career Certificate Core Requirement

Description: This module explains how to identify, select, and install pipe hangers and supports, including spring can supports. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
3	1	4	75

National Assessment: Selected Module of NCCER Pipefitting Level III Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 08308-07 Pipe Hangers and Supports

1. Identify types of pipe hangers and supports.
2. Identify and interpret pipe support drawings and symbols.
3. Determine field placement of hangers.
4. Identify and install concrete fasteners.
5. Fabricate angle iron brackets to support pipe.
6. Identify and explain the types of spring can supports.
7. Identify and explain the types of variable spring can supports.
8. Identify and explain the types of constant spring can supports.
9. Explain the storing and handling procedures for spring can supports.
10. Explain how to install spring can supports.
11. Maintain spring can supports.

Performance Task
Under the supervision of the instructor, students should be able to complete the following:

1. Identify types of pipe hangers.
2. Identify types of connecting units and attachments.
3. Identify types of pipe supports.
4. Read and interpret pipe support drawings and symbols.
5. Install nonexpanding concrete fasteners.

6. Install expanding concrete fasteners.
7. Install toggle bolts.
8. Lay out and mark the cut lines required to fabricate a one-piece 45-degree angle iron bracket.
9. Lay out and mark the cut lines required to fabricate a one-piece 30- by 60-degree angle iron bracket.
10. Identify spring can support types.
11. Read and interpret spring can support detail sheets.
12. Install spring can supports.
13. Remove the travel stops from a spring can support.
14. Adjust a spring can support to the cold position.

Course Number and Name: **MPT 2181** **In-line Specialties and Standards and Specifications**

Classification: Technical Certificate Core Requirement

Description: This module explains how to read and interpret pipefitting standards, codes, and specifications. It describes how to identify pipe and components according to specifications. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
1	1	0	15

National Assessment: Selected Module of NCCER Pipefitting Level III Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 08303-07 Standards and Specifications

1. Understand and interpret pipefitting standards and codes.
2. Read and interpret pipefitting specifications.
3. Identify pipe and components according to specifications.

Course Number and Name: **MPT 2253 Advanced Pipe Fabrication**

Classification: Technical Certificate Core Requirement

Description: This module presents various piping offsets: three-line, 45-degree, equal spread offsets around a vessel, and three-line, 45-degree, unequal offsets. It also covers how to fabricate tank coils; three, four, and fivepiece mitered turns; 45-degree laterals using both references; and contour markers, dummy legs out of both pipe and structural steel, and mitering procedures. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
3	1	4	75

National Assessment: Selected Module of NCCER Pipefitting Level IV Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 08402-07 Advanced Pipe Fabrication

1. Calculate simple piping offsets.
2. Calculate three-line, 45-degree, equal-spread offsets around a vessel.
3. Calculate three-line, 45-degree, unequal-spread offsets.
4. Fabricate tank heating coils.
5. Perform mitering procedures.
6. Lay out three- and four-piece mitered turns.
7. Lay out 45-degree laterals, using references or a calculator.
8. Fabricate dummy legs and trunions out of pipe, using references.
9. Perform geometric layout of pipe laterals and supports.
10. Lay out and fabricate a fishmouth.
11. Lay out and fabricate a wye.

Performance Task
Under the supervision of the instructor, students should be able to complete the following:

1. Solve a simple piping offset.
2. Calculate a three-line, 45-degree, equal-spread offset.
3. Calculate a three-line, 45-degree, unequal-spread offset.

4. Calculate and lay out a tank coil.
5. Lay out and fabricate a three-piece mitered turn, degree to be determined by the instructor.
6. Lay out and fabricate a four-piece, 90-degree, mitered turn.
7. Lay out and fabricate a 45-degree lateral, using reference charts.
8. Lay out and fabricate a type 1 pipe support.
9. Lay out a 45-degree lateral by performing geometric layout.
10. Lay out and fabricate a fishmouth.
11. Lay out and fabricate a wye.

Course Number and Name: **MPT 2511 Stress Relieving and Alignment**

Classification: Technical Certificate Core Requirement

Description: This module explains thermal expansion methods of stress-relieving, including preheating, interpass heating, and postheating. It also shows how to perform stress-relief and dry washing weld procedures to align pipe flanges to equipment nozzles. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
1	1	0	15

National Assessment: Selected Module of NCCER Pipefitting Level IV Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 08403-07 Stress Relieving and Aligning

1. Explain thermal expansion, anchors, and cold springing.
2. Explain stress-relief procedures.
3. Explain grouting.
4. Explain types of misalignment.
5. Align pipe flanges to rotating equipment nozzles.

Performance Task
Under the supervision of the instructor, students should be able to complete the following:

1. Identify three methods used to stress-relieve welds.
2. Indicate the area of a pipe that needs to be stress-relieved.

Course Number and Name: **MPT 2521 Steam Traps**

Classification: Technical Certificate Core Requirement

Description: This module identifies types of steam traps, including mechanical, thermostatic, and thermodynamic. It explains how to install steam traps and troubleshoot steam trap systems. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
1	1	0	15

National Assessment: Selected Module of NCCER Pipefitting Level IV Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 08404-07 Steam Traps

1. Identify types of steam traps.
2. Install steam traps.
3. Troubleshoot steam trap systems.

Performance Task
Under the supervision of the instructor, students should be able to complete the following:

1. Identify the different types of steam traps.
2. Install steam traps.
3. Identify specific problems and corrective actions required for faulty steam traps.

Course Number and Name: **MPT 2532 Special Piping**

Classification: Technical Certificate Core Requirement

Description: This module explains how to assemble flared and compression joints using copper tubing, how to solder and braze joints using copper tubing, and how to bend pipe to a specified radius. It also explains how to install glass-lined pipe, hydraulic fitted compression joints, and grooved pipe couplings. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
2	1	2	45

National Assessment: Selected Module of NCCER Pipefitting Level IV Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 08406-07 Special Piping

1. Install flared and compression joints, using copper tubing.
2. Solder and braze joints, using copper tubing.
3. Bend pipe to a specified radius.
4. Install glass-lined pipe.
5. Explain how to install hydraulic fitted compression joints.
6. Install grooved pipe couplings.

Performance Task
Under the supervision of the instructor, students should be able to complete the following:

1. Install flared fittings using copper tubing.
2. Install compression fittings using copper tubing.
3. Solder copper tubing joints.
4. Braze copper tubing joints.
5. Bend pipe or tubing to a specified radius.
6. Install grooved pipe couplings.

Course Number and Name: **MPT 2541 Maintaining Valves**

Classification: Technical Certificate Core Requirement

Description: This module explains how to remove threaded and flanged valves, how to replace valve stem O-ring and bonnet gaskets, and how to repack a valve stuffing box. It also discusses the purpose of valve packing. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
1	1	0	15

National Assessment: Selected Module of NCCER Pipefitting Level IV Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 08408-07 Maintaining Valves

1. Remove and install threaded valves.
2. Remove and install flanged valves.
3. Replace valve stem O-rings.
4. Replace bonnet gaskets.
5. Explain the purpose of valve packing.
6. Explain or demonstrate how to repack a valve.

Performance Task
Under the supervision of the instructor, students should be able to complete the following:

1. Demonstrate how to remove and install threaded valves.
2. Remove and install flanged valves.
3. Replace valve stem O-rings.
4. Replace bonnet gaskets.
5. Demonstrate repacking a valve.

Course Number and Name: **MPT 2613 Fundamentals of Leadership**

Classification: Technical Certificate Core Requirement

Description: This module covers the basic skills required for supervising personnel, including diversity, project organization, problem solving, and safety. Instructors for this course must be certified as an NCCER Instructor.

Hour Breakdown:

Scheduled Hours	Lecture	Lab	Clock Hours
3	3	0	45

National Assessment: Selected Module of NCCER Pipefitting Level IV Credential

Prerequisite: Instructor Approved

Student Learning Outcomes:

Module 08409-07 Introduction to Supervisory Roles

1. Explain the importance of training for construction industry personnel.
2. Identify the gender and minority issues associated with a changing workforce.
3. Describe what employers can do to prevent workplace discrimination.
4. Describe the four major categories of construction projects.
5. Describe the difference between formal and informal organizations, as well as the difference between authority and responsibility.
6. Explain the purpose and content of a job description and a policy/procedure document.
7. List the characteristics and behavior of effective leaders, as well as the different leadership styles.
8. Explain the difference between problem solving and decision making.
9. Describe strategies for reducing absenteeism and turnover.
10. Explain the duties of a crew leader in enforcing safety on the job.

RECOMMENDED TOOLS AND EQUIPMENT

Capitalized Items

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

1. Bending machine (1)
2. Machine pipe threading (2)
3. 17-in. drill press (1)
4. Cutoff saw (1)
5. Metal hand saw (1)
6. Vertical band saw (1)
7. Hydrostatic tester (1)
8. AC–DC welder (4)
9. Welding, cutting, and brazing outfit (4)
10. Plasma cutting unit (1)
11. Pipe beveler, 2 in. through 6 in. (1)
12. Flange facer (1)
13. Elbow mandrel, 2 in. to 6 in. (1)
14. Iron worker machine – 66 T (1)

Non-Capitalized Items

1. Student tool box containing:
2. Pipe wrenches – 8 in., 10 in., 12 in., 14 in., 18 in., 24 in., and 36 in. (1 each)
3. Box end wrenches 1/16 sizes: 1/8 in. through 1 1/4 in. (2 sets)
4. Adjustable wrenches – 6 in., 8 in., 10 in., 12 in., and 15 in. (1 each)
5. Spud (monkey) wrench set 1/32 in. through 1/2 in. (2 each)
6. Grinder (2)
7. Angle grinder (2)
8. Offset grinder (3)
9. Pedestal grinder(2)
10. 1-ton chain hoist (2)
11. 14-in. circular saw (1)
12. Fabrication tables (10)
13. Tool set, 14-piece, precision layout and contour (1)
14. Pneumatic or electric wire brush (2)
15. Dies with segments 2 1/2 in.–4 in., rigid (2)
16. Vise 1/8 in.–2 in. (10)
17. Portable saw (1)
18. Reciprocating saw (2)
19. Flat screwdrivers, 6 per set (1 set)
20. Phillips screwdrivers, 6 per set (1 set)
21. Ball-peen hammers – 8 oz, 10 oz, 12 oz, and 20 oz (2 sets)

22. Double flare S tubing flaring set (1)
23. Single flare S tubing flaring set (2)
24. Hand tubing benders – 1/4 in.–7/8 in. (1)
25. Wrap-o-round (pipe) (6)
26. Framing square (pipefitters) (6)
27. Combination square (6)
28. 6-ft folding rules (10)
29. 12-ft measuring tapes (2)
30. 25-ft measuring tapes (2)
31. 24-in. nylon strap wrench (1)
32. 18-in. chain wrench (1)
33. 1/2-in. offset drill motor, variable speed (1)
34. 1/2-in. variable speed drill motor (1)
35. 3/8-in. variable speed drill motor (1)
36. Welding shields (6)
37. Burning goggles (3)
38. Grinding full face shields (6)
39. 50-ft heavy duty extension cords (2)
40. 6-ft folding step ladders, fiberglass (2)
41. Hole saw kit, 1 1/2 in.–4 1/2 in. (2)
42. Hacksaws (3)
43. 10-in., 12-in., and 14-in. half round files (6 each)
44. Locking pliers (3)
45. Torpedo levels (6)
46. 2-ft level (1)
47. 4-ft level (1)
48. 1/2-in. i.d. x 50-ft air hose (4)

Recommended Instructional Aids

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

1. Scientific calculator (1)
2. Computer with operating software with multimedia kit (1)
3. Document projection camera (1)
4. TV–VCR/DVD (1)
5. Data projector (1)
6. Laptop computer (1)
7. Digital camera
8. Digital scanner
9. Interactive display board

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

- 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)