Maritime Apprenticeships
Mississippi Curriculum Framework

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3825 Ridgewood Road
Jackson, MS 39211
Phone: 601-432-6155
Email: curriculum@mccb.edu

Administrator Writing Team Members

Brock Clark, Dean, Workforce
Kelly Dye, Maritime Director, Workforce

Business and Industry Writing Team Members

Garry Mercer, Manager, Workforce Development, Ingalls Shipbuilding
Alex Yim, Manager, Functional Development, Ingalls Shipbuilding
Doug Hudson, Manager, Workforce Development, Ingalls Shipbuilding
Bobby Lamb, Manager, Apprentice School, Ingalls Shipbuilding
Anna Bourdais, Manager, Learning Development, Ingalls Shipbuilding
Victoria Hunt, Manager, Shipbuilder Academy, Ingalls Shipbuilding
Clint Davis, Manager, Electrical, Ingalls Shipbuilding

Office of Curriculum and Instruction Team Members

Scott Kolle, Ph.D., Director of Curriculum, Mississippi Community College Board
LaToya Sterling Ph.D., Curriculum Specialist, Mississippi Community College Board
Sheriece Robinson, Ed.D. Curriculum Specialist, Mississippi Community College Board

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.

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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 was 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 industrial 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, while eliminating state boarders.

NCCER's workforce development 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 Construction Management.

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 visit http://mcef.net/.

INDUSTRY JOB PROJECTION DATA

The Maritime Training Option occupations require an on-the-job-training. There is expected to be a 12.23% increase in occupational demand at the regional level and 12.23% increase at the state level. Median annual income for this occupation is $41,153.19 at the state level. A summary of occupational data from the State Workforce Investment Board Center is displayed below. .

Table 1: Education Level

Program Occupations	**Education Level**
Construction Carpenters	Long-Term on- the- job training
Electricians	Long-Term on- the- job training
Painters, Construction and Maintenance	Moderate-term on the job training
Insulation Workers, Mechanical	Moderate-term on the job training
Pipe Fitters and Steamfitters	Long-Term on- the- job training
Machinists	Long-Term on- the- job training
Sheet Metal Workers	Long-Term on- the- job training
Solderers and Brazers	Long-Term on- the- job training
Welding, Soldering, and Brazing Machine Setters, Operators and Tenders	Moderate-term on the job training
Riggers	Long-Term on- the- job training

Table 2: Occupational Overview

	Region	**State**	**United States**
2016 Occupational Jobs	29,345	29,345	2,894,704
2026 Occupational Jobs	32,933	32,933	3,465,120
Total Change	3,588	3,588	570,416
Total % Change	12.23%	12.23%	19.71%
2016 Median Hourly Earnings	$19.79	$19.79	$21.36
2016 Median Annual Earnings	$41,153.19	$41,153.19	$44,436.00
Annual Openings	359	359	57042

Table 3: Occupational Breakdown

Description	**2016 Jobs**	**2026 Jobs**	**Annual Openings**	**2016 Hourly Earnings**	**2016 Annual Earnings 2,080 Work Hours**
Construction Carpenters	5,463	5,828	37	$16.93	$35,214.40
Electricians	5,555	7,197	164	$23.63	$49,150.40
Painters, Construction and Maintenance	1,303	1,321	2	$15.64	$32,531.20
Insulation Workers, Mechanical	159	159	0	$24.94	$51,875.20

Pipe Fitters and Steamfitters	4,015	5,511	150	$21.12	$43,929.60
Machinists	3,906	3,923	2	$19.77	$41,121.60
Sheet Metal Workers	1,364	1,403	4	$16.56	$34,444.80
Solderers and Brazers	6,577	6,589	1	$20.77	$43,163.20
Welding, Soldering, and Brazing Machine Setters, Operators and Tenders	698	697	0	$17.26	$35,900.80
Rigger	305	305	0	$21.41	$44,532.80

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
Construction Carpenters	365	6.68%	6.68%	21.38%
Electricians	1,642	29.56%	29.56%	34.53%
Painters, Construction and Maintenance	18	1.38%	1.38%	3.49%
Insulation Workers, Mechanical	0	0.00%	0.00%	2.45%
Pipe Fitters and Steamfitters	1,496	37.26%	37.26%	45.29%
Machinists	17	0.44%	0.44%	1.63%
Sheet Metal Workers	39	2.86%	2.86%	6.73%
Solderers and Brazers	12	0.18%	0.18%	1.68%
Welding, Soldering, and Brazing Machine Setters, Operators and Tenders	-1	-0.14%	-0.14%	-1.25%
Riggers	0	0.00%	0.00%	1.13%

ARTICULATION

There is no secondary course that articulates to this program at this time.

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: https://www.nccer.org/workforce-development-programs/credentials-registry

ONLINE AND BLENDED LEARNING OPPORTUNITIES

Course content included lecture and laboratory semester credit hours. Faculty members are encouraged to present lecture related content to students in an online or blended learning environment where possible. Training related to online and blended learning will be available to faculty members through the MS Community College Board's Division of Workforce, Office of Curriculum and Instruction.

INSTRUCTIONAL STRATEGIES

The NCCER curriculum was adopted and provides instructional strategies to faculty member implementing the curriculum.

ASSESSMENT STRATEGIES

The NCCER curriculum was adopted and provides assessment strategies to faculty members implementing the curriculum. Additionally, performance tasks were included in course content when appropriate.

PROGRAM DESCRIPTION

The Maritime Technology: Apprentice Options program prepares students for employment and advancement in all Maritime Technology program areas. The program will prepare students for work as apprentices with Huntington Ingalls Shipbuilding. A variety of different apprenticeship program areas are offered which includes the following:

- Carpenter
- Painter
- Electrical
- Electrical Maintenance
- Inside Machinist
- Joiner
- Outside Machinist
- Pipe Fitter
- Pipe Insulation
- Pipe Welder
- Rigger
- Sheet Metal
- Shipfitter
- Welder

The goal is to award competency-based credit to students in the Ingalls Apprenticeship Program by allowing students to earn credit toward their degree by demonstrating specific knowledge and skills related to their program of study.

SUGGESTED COURSE SEQUENCE-MARITIME APPRENTICESHIP

Career Certificate Required Courses (Carpenter Apprenticeship)

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	**Course Name**	**Semester Credit Hours**	**Lecture**	**Lab**	**Total Clock Hours**	**Lecture**	**Lab**	**Certification Name**
MTA 1743	Fundamentals of Drafting for Maritime	3	2	2	60			
MTA 1153	Introduction to Shipbuilding and Blueprint Reading	3	2	2	60			
MTA 2643	Naval Architecture and Ship Structures for Maritime	3	2	2	60			
MTA 1122	Carpenter Shop I	2	0	4	60			
MTA 1133	Carpenter Shop II	3	2	2	60			
MTA 1004	Supervised Work Experience	4	3	2	75			
MTA 1113	Occupational Math	3	2	2	60			
MMT 2213	Principles of Management	3	2	2	60			
MTA 1143	Blueprint Reading for Carpenter	3	2	2	60			
MTA 1643	Production Planning and Control	3	2	2	60			
	TOTAL	**30**						

Career Certificate Required Courses (Painter Apprenticeship)

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	**Course Name**	**Semester Credit Hours**	**Lecture**	**Lab**	**Total Clock Hours**	**Lecture**	**Lab**	**Certification Name**
MTA 1174	Introduction to Paint	4	3	2	75			
MTA 2643	Naval Architecture and Ship Structures for Maritime	3	2	2	60			
MTA 1654	Inspection Fundamentals	4	3	2	60			
MTA 1663	Surface Preparation	3	2	2	60			
PPT 1513	Safety, Health, &Environment	3	2	2	60			
MTA 1673	Spray Painting	3	2	2	60			
MTA 1004	Supervised Work Experience	4	3	2	60			
MTA 1633	Project Management	3	2	2	60			
	Elective	3	2	2	60			
	TOTAL	**30**						

Career Certificate Required Courses (Electrical Apprenticeship)

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	**Course Name**	**Semester Credit Hours**	**Lecture**	**Lab**	**Total Clock Hours**	**Lecture**	**Lab**	**Certification Name**
EET 1114	DC Circuits	4	3	2	75			
EET 1214	Digital Electronics	4	3	2	75			
EET 1123	AC Circuits	3	2	2	60			
EET 1334	Solid State Devices	4	3	2	75			
EET 2363	Programmable Logic Controllers	3	2	2	60			
EET 2354	Solid State Motor Controls	4	3	2	75			
EET 2414	Electronic Communications	4	3	2	75			
EET 2423	Fundamentals of Fiber Optics	3	1	4	75			
MTA 1001	Supervised Work Experience	1						
	TOTAL	**30**						

Career Certificate Required Courses (Electrical Maintenance Apprenticeship)

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	**Course Name**	**Semester Credit Hours**	**Lecture**	**Lab**	**Total Clock Hours**	**Lecture**	**Lab**	**Certification Name**
EET 1114	DC Circuits	4	3	2	75			
EET 1214	Digital Electronics	4	3	2	75			
EET 1123	AC Circuits	3	2	2	60			
EET 1334	Solid State Devices	4	3	2	75			
EET 2363	Programmable Logic Controllers	3	2	2	60			
EET 2354	Solid State Motor Controls	4	3	2	75			
EET 2414	Electronic Communications	4	3	2	75			
EET 2423	Fundamentals of Fiber Optics	3	3	2	75			
MTA 1001	Supervised Work Experience	1						
	TOTAL	**30**						

Career Certificate Required Courses (Inside Machinist Apprenticeship)

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	**Course Name**	**Semester Credit Hours**	**Lecture**	**Lab**	**Total Clock Hours**	**Lecture**	**Lab**	**Certification Name**
MTA 1153	Introduction to Shipbuilding and Blueprint Reading	3	2	2	60			
MTA 2264	Marine Systems Integration for Maritime	4	3	2	75			
MEC 1113	Mechanical Maintenance	3	2	2	60			
MTA 1314	Power Machinery	4	3	2	75			
MTA 1323	Precision Layout	3	2	2	60			
MTA 1743	Fundamentals of Drafting for Maritime	3	2	2	60			
MTA 1004	Supervised Work Experience	4	3	2	75			
MTA 1113	Occupational Math	3	2	2	60			
MMT 2213	Principles of Management	3	2	2	60			
	TOTAL	**30**						

Career Certificate Required Courses (Joiner Apprenticeship)

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	**Course Name**	**Semester Credit Hours**	**Lecture**	**Lab**	**Total Clock Hours**	**Lecture**	**Lab**	**Certification Name**
MTA 1183	Introduction to Joiner & Sheet Metal	3	2	2	60			
MTA 1633	Project Management	3	2	2	60			
MTA 1384	Blueprint Reading for Joiner	4	2	2	60			
MTA 1283	Layout II	3	2	2	60			
PPT 1513	Safety, Health & Environment	3	2	2	60			
MTA 1643	Production Planning and Control	3	2	2	60			
MTA 1003	Supervised Work Experience	3	1	2	45			
MTA 1112	Occupational Math	2	1	0	60			
MTA 1743	Fundamentals of Drafting for Maritime	3	2	2	60			
MTA 1153	Introduction to Shipbuilding and Blueprint Reading	3	2	2	60			
	TOTAL	**30**						

Career Certificate Required Courses (Outside Machinist Apprenticeship)

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	**Course Name**	**Semester Credit Hours**	**Lecture**	**Lab**	**Total Clock Hours**	**Lecture**	**Lab**	**Certification Name**
MTA 1153	Introduction to Shipbuilding and Blueprint Reading	3	2	2	60			
MTA 2643	Naval Architecture and Ship Structures for Maritime	3	2	2	60			
MTA 2664	Marine Systems Integration for Maritime	4	3	2	75			
MEC 1113	Mechanical Maintenance	3	2	2	60			
MTA 1314	Power Machinery	4	3	2	75			
MTA 1323	Precision Layout	3	2	2	60			
MTA 1743	Fundamentals of Drafting for Maritime	3	2	2	60			
MTA 1004	Supervised Work Experience	4	3	2	75			
MTA 1113	Occupational Math	3	2	2	60			
	TOTAL	**30**						

Career Certificate Required Courses (Pipe Fitter Apprenticeship)

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	**Course Name**	**Semester Credit Hours**	**Lecture**	**Lab**	**Total Clock Hours**	**Lecture**	**Lab**	**Certification Name**
MTA 1153	Introduction to Shipbuilding and Blueprint Reading	3	2	2	60			
MTA 2643	Naval Architecture and Ship Structures for Maritime	3	2	2	60			
MTA 2664	Marine Systems Integration Maritime	4	2	2	60			
MMT 2213	Principles of Management	3	2	2	60			
MTA 2274	Marine PipeFitting	4	3	2	75			
MTA 1643	Production Planning and Control	3	2	2	60			
MTA 1004	Supervised Work Experience	4	3	2	75			
MTA 1113	Occupational Math	3	2	2	60			
MTA 1743	Fundamentals of Drafting for Maritime	3	2	2	60			
	TOTAL	**30**						

Career Certificate Required Courses (Pipe Insulation Apprenticeship)

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	**Course Name**	**Semester Credit Hours**	**Lecture**	**Lab**	**Total Clock Hours**	**Lecture**	**Lab**	**Certification Name**
MTA 1684	Introduction to Insulation	4	3	2	75			
MTA 2643	Naval Architecture and Ship Structures for Maritime	3	2	2	60			
MMT 2213	Project Management	3	2	2	60			
MTA 1153	Introduction to Shipbuilding and Blueprint Reading	3	2	2	60			
MTA 1623	Metal Lagging	3	2	2	60			
PPT 1513	Safety, Health & Environment	3	2	2	60			
MTA 1005	Supervised Work Experience	5	3	2	75			
MTA 1113	Occupational Math	3	2	2	60			
MTA 1743	Fundamentals of Drafting for Maritime	3	2	2	60			
	TOTAL	**30**						

Career Certificate Required Courses (Pipe Welder Apprenticeship)

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	**Course Name**	**Semester Credit Hours**	**Lecture**	**Lab**	**Total Clock Hours**	**Lecture**	**Lab**	**Certification Name**
MTA1153	Introduction to Shipbuilding and Blueprint Reading	3	2	2	60			
MTA 2643	Naval Architecture and Ship Structures for Maritime	3	2	2	60			
MTA 2664	Marine Systems Integration Maritime	4	3	2	75			
MMT 2213	Principles of Management	3	2	2	60			
MTA 1354	Weld Theory and Techniques	4	3	2	75			
MTA 1344	Shielded Metal Arc Welding	4	3	2	75			
MTA 1003	Supervised Work Experience	3	2	2	60			
MTA 1413	Blueprint Reading for Pipe	3	2	2	60			
MTA 1163	Advanced Pipe Welding	3	2	2	60			
	TOTAL	**30**						

Career Certificate Required Courses (Rigger Apprenticeship)

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	**Course Name**	**Semester Credit Hours**	**Lecture**	**Lab**	**Total Clock Hours**	**Lecture**	**Lab**	**Certification Name**
MTA 1153	Introduction to Shipbuilding and Blueprint Reading	3	2	2	60			
MTA 2643	Naval Architecture and Ship Structures for Maritime	3	2	2	60			
MMT 2213	Principles of Management	3	2	2	60			
MTA 1743	Fundamentals of Drafting for Maritime	3	2	2	60			
MTA 1643	Production Planning and Control	3	2	2	60			
MTA 1004	Supervised Work Experience	4	3	2	75			
MTA 1113	Occupational Math	3	2	2	60			
MTA 1194	Rigger Shop I	4	3	2	75			
MTA 1214	Rigger Shop II	4	3	2	75			
	TOTAL	**30**						

Career Certificate Required Courses (Sheet Metal Apprenticeship)

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	**Course Name**	**Semester Credit Hours**	**Lecture**	**Lab**	**Total Clock Hours**	**Lecture**	**Lab**	**Certification Name**
MTA 1183	Introduction to Joiner and Sheet Metal	3	2	2	60			
MTA 1743	Fundamentals of Drafting for Maritime	3	2	2	60			
MTA 2643	Naval Architecture and Ship Structures for Maritime	3	2	2	60			
PPT 1513	Safety, Health & Environment	3	2	2	60			
MTA 1113	Occupational Math	3	2	2	60			
MTA 1633	Project Management	3	2	2	60			
MTA 1003	Supervised Work Experience	3	2	2	60			
MTA 1153	Introduction to Shipbuilding and Blueprint Reading	3	2	2	60			
MTA 1283	Layout II	3	2	2	60			
MTA 1293	Layout III	3	2	2	60			
	TOTAL	**30**						

Career Certificate Required Courses (Shipfitter Apprenticeship)

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	**Course Name**	**Semester Credit Hours**	**Lecture**	**Lab**	**Total Clock Hours**	**Lecture**	**Lab**	**Certification Name**
MTA 1244	Introduction to Shipfitting	4	3	2	75			
MTA 1153	Introduction to Shipbuilding and Blueprint Reading	3	2	2	60			
MTA 2643	Naval Architecture and Ship Structures for Maritime	3	2	2	60			
MTA 1113	Occupational Math	3	2	2	60			
MTA 1643	Fundamentals of Drafting for Maritime	3	2	2	60			
MTA 1223	Blueprint Reading for Shipfitters	3	2	2	60			
MTA 2664	Marine Systems Integration	4	3	2	75			
MTA 1254	Journeyman Essentials for Shipfitters	4	3	2	75			
MTA 1003	Supervised Work Experience	3	3	2	75			
	TOTAL	**30**						

Career Certificate Required Courses (Welder Apprenticeship)

			SCH Breakdown			Clock Hour Breakdown		Certification Information
Course Number	**Course Name**	**Semester Credit Hours**	**Lecture**	**Lab**	**Total Clock Hours**	**Lecture**	**Lab**	**Certification Name**
MTA 1153	Introduction to Shipbuilding and Blueprint Reading	3	2	2	60			
MTA 2643	Naval Architecture and Ship Structures for Maritime	3	2	2	60			
MTA 1333	Safety for Welders	3	2	2	60			
MTA 1344	Shielded Metal Arc Welding	4	3	2	75			
MMT 2213	Principles of Management	3	2	2	60			
MTA 1263	Journeyman Essentials for Welders	3	2	2	60			
MTA 1354	Weld Theory and Technique	4	3	2	75			
MTA 1233	Flux Cored Arc Welding	3	2	2	60			
MTA 1004	Supervised Work Experience	4	3	2	75			
	TOTAL	**30**						

Electives Listing

			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						
MTA 1423	Fundamentals of Logistics	3						
MTA 1433	Transportation and Distribution	3						
MTA 1443	Material Management	3						
MTA 1453	Purchasing	3						
MTA 1463	Supply Chain Management	3						
MTA 1473	Logistics Management	3						
MTA 1483	Principles of Maritime Marketing	3						
MTA 1493	Maritime Employee Management	3						
MTA 1613	Shipbuilder Exploration	3						
MTA 1373	Blueprint Reading for Insulation	3						
MTA 1393	Blueprint Reading for Machinist	3						
MTA 1413	Blueprint Reading for Pipe	3						
MTA 1693	Blueprint Reading for Sheet Metal	3	2	2	60			

Required Courses

Course Number and Name: **MTA 1743** **Fundamentals of Drafting for Maritime**

Description: Fundamentals and principles of drafting to provide the basic background needed for all other drafting courses.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

Refer to the current Drafting curriculum for updated Student Learning Outcomes.

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

Course Number and Name: **MTA 2643 Naval Architecture and Ship Structures for Maritime**

Description: This course provides in-depth insight into the overall shipbuilding process.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:
Refer to the current Drafting curriculum for updated Student Learning Outcomes.

1. Explain the basic design of a ship including the ship dimensions, form, size, or category.
   a. Explain the progression of design through the three stages.
   b. Describe the effect waterway restrictions have on the ship's design.
   c. Discuss the basics of displacement as it applies to a ship.
   d. Differentiate between lightweight and deadweight and their effects on ship displacement.
   e. Explain the contract process in purchase of a new vessel.

2. Contrast hull forms of ships from 1940-1970 as compared to modern day ships.
   a. Describe and distinguish among oil tankers, bulk carriers, car carriers, RO/RO, and container ships.
   b. Describe modern day cargo handling equipment.

3. Explain the purpose of a classification society.
   a. List the Classification Societies that are full members of the IACS.
   b. Compare International Association of Classification Societies (IACS) members of Lloyds Register to the American Bureau of Shipping (ABS).

4. Explain the various processes used to make steel.
   a. Describe the common steel alloys and/or grades of steel used in the defense industry.
   b. List and define the methods used in heat treating steels.
   c. Differentiate between steel plates and steel shapes.
   d. Distinguish between stress and strain as applied during material testing.
   e. Describe the "tensile" test and its application to steel shipbuilding.
   f. Explain the Charpy V Notch test and its purpose.

5. Compare and contrast the stresses to which a ship is subject.
   a. Describe how the weight and buoyancy of a ship applies to the displacement of water.
   b. Differentiate between "hogging" and "sagging" of a ship's hull.
   c. Describe the application of bending moments in shaping the hull of a ship.
   d. Identify and differentiate between local and transverse stresses
   e. Describe the interrelationship between stresses and strength members within a ship.
   f. List and explain the structural failures.

6. Explain the welding and cutting processes used in building DOD ships.
   a. Describe the electric arc welding process as it applies to welding electrodes.

b. Differentiate among downhand, horizontal vertical, vertical, and overhead welding processes.
c. Describe the arc welding processes used in shipbuilding.
    - Flux Cored Arc Welding (FCAW)
    - Submerged Arc Welding (SAW)
    - Tuntsten Inert Gas (TIG)
    - Metal Inert Gas (MIG)
d. State the purpose of fluxes and shielding gasses used in welding.

7. Describe welding and testing processes of structural steel used in building DOD ships.
    a. Describe the gouging process.
    b. Explain a butt welded joint and the types of edge preparations.
    c. Describe the various types of edge preparations and their purpose.
    d. Discuss the welding methods.
        - Butt welded joint
        - Tack welds
        - Backstep
        - Wandering
    e. State the purpose of testing welds.

8. Explain the interaction of the ship drawing office with development of the product model.
    a. Explain the different types of plans/drawings.
        - Lines
        - Expansion
    b. Describe the use of CAD/CAM in developing the Ship Product Model.
    c. Describe the mold loft process.
    d. Discuss the nesting and identification of piece parts as material is cut during construction.

9. Explain the flow of material through a shipyard.
    a. Explain how plates and material are handled in the machine shops.
        - Shot blasting process performed in the Wheelabrator
        - Plate profiling machines and methods
        - Planning machines and methods
        - Drilling machines
        - Guillotines/Shears
        - Presses/Hydraulic
        - Use of plate rolls for rolling shell plate
    b. Discuss the various bending processes.
        - Heat line
        - Frame
        - Cold frame
    c. Describe the use of robotics in shipbuilding.
    d. Explain the plate profiling machines and methods.

10. Understand the prefabrication and launching processes.
    a. Compare and contrast prefabrication of module versus block style of construction.
        - Sub-assemblies
        - Unit fabrication

b. List and explain the advantages of pre-outfitting modules during the construction process.
c. Describe the ship lift/floating dry dock method used to launch ships.
d. Explain the purpose of the Engineering Test & System Assurance (ETSA) memo for launching a ship and the ETSA memo stern release handout.

11. Understand the flow of materials through a shipyard.
    a. Describe the general layout of a shipyard.
    b. Explain the flow of materials in constructing a ship.
    c. Describe the ship lift/floating dry dock method used to launch ships.
    d. Summarize the current steps and processes entailed in building ships.

Course Number and Name: **MTA 2664** **Marine Systems Integration for Maritime**

Description: The course will place an emphasis on the integration of hull and machinery systems into a complete vessel package. The design and analysis of general guidance, hull structure, propulsion, electrical, command and surveillance, auxiliary systems, outfitting and furnishing and armament are investigated. Included is the study of equipment installation, plating, bulkheads, propulsion systems, power generation, and combat systems HVAC, and weapons management

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes:
Refer to the current Drafting curriculum for updated Student Learning Outcomes.

1. Understanding of the various roles in the marine industry.
2. Increased understanding and appreciation of the major systems that comprise the complete vessel package.
3. Increased understanding of the operations of the components that make-up these systems.
4. Understanding of the inter-relationship among the varying systems that support ship operation.
5. Exposure to the various engineering laws and principles that are used to design and engineer these major systems.
6. Increased ability to interact with designers and engineers from various system and engineering disciplines.

Course Number and Name: **EET 1114** **DC Circuits**

Description: Principles and theories associated with DC circuits. This course includes the study of electrical circuits, laws and formulae, and the use of test equipment to analyze DC circuits.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4			

Prerequisite: Instructor Approved

Student Learning Outcomes:
Refer to the current curriculum for updated Student Learning Outcomes.

1. Demonstrate and practice general safety procedures in the school and work-site environments.
   a. Apply relevant and appropriate safety techniques.
   b. Demonstrate an understanding of and comply with relevant OSHA safety standards.

2. Demonstrate and apply an understanding of a basic electrical circuit.
   a. Write numbers in scientific and engineering notation.
   b. Perform mathematical manipulations with numbers expressed in engineering notation.
   c. Explain the basic structure of matter to include the atom and element.
   d. Explain the laws of electrical charge.
   e. Differentiate among the characteristics of conductors, semiconductors, and insulators.
   f. Demonstrate the ability to determine resistor types, value, tolerance, and power rating.
   g. Differentiate between DC circuit schematic symbols.
   h. Demonstrate proper techniques for measuring resistance.
   i. Discuss methods of generating electricity.
   j. Explain theories of current flow including electron and conventional method.
   k. Demonstrate an understanding of principles of and operation of batteries.
   l. Explain and demonstrate the measurement of resistance of conductors and insulators and the computation of conductance.

3. Demonstrate an understanding of voltage, current, resistance, and power and how they relate.
   a. Explain the physical properties of voltage, current, and resistance.
   b. State three equations used to express Ohm's law.
   c. Analyze circuit parameters using Ohm's law.
   d. Explain how power is developed in a circuit.
   e. State three forms of power equations.
   f. Demonstrate techniques for determining power.
   g. Describe and demonstrate the proper technique for measuring voltage using a voltmeter.
   h. Describe and demonstrate the proper technique for measuring current using an ammeter.
   i. Describe and demonstrate the proper technique for measuring resistance using an ohmmeter.

4. Analyze and evaluate the parameters of a series circuit.
   a. Identify series circuits.
   b. Compute total resistance of a series circuit.
   c. Using Ohm's law, compute the current in a series circuit.
   d. Explain why current is the same at all points in a series circuit.
   e. State and apply Kirchhoff's voltage law in analysis of series circuits.
   f. Explain why a series circuit is known as a voltage divider.
   g. Using Ohm's law, compute the voltage drops in a series circuit.

h. Compute the power developed by each resistor and the total power of a series circuit.
i. Explain the difference between series-aiding and series-opposing voltage sources.
j. Construct, analyze, and troubleshoot a series circuit.

5. Analyze and evaluate the parameters of a parallel circuit.
   a. Identify parallel circuits.
   b. Compute total resistance of a parallel circuit.
   c. Utilize Ohm's law to solve circuit parameters of a parallel DC circuit.
   d. Explain why voltage is the same across all branches of a parallel circuit.
   e. State and apply Kirchhoff's current law in the analysis of parallel circuit.
   f. Explain why a parallel circuit is a current divider.
   g. Compute branch currents in a parallel resistive circuit using the current divider equation.
   h. Construct, analyze, and troubleshoot a parallel circuit.

6. Analyze and evaluate the parameters of a series–parallel circuit.
   a. Differentiate between series and parallel in a series–parallel resistive circuit.
   b. Compute total resistance of a series–parallel circuit.
   c. Analyze series–parallel circuits for the current through and the voltage across each component.
   d. Construct, analyze, and troubleshoot a series–parallel circuit.
   e. Analyze loaded and unloaded voltage dividers.
   f. Explain the operation and application of a Wheatstone bridge.
   g. Construct a resistive bridge circuit, and measure an unknown resistance.
   h. Measure the error voltage of an unbalanced bridge.

7. Apply network theorems to the analysis of complex circuits.
   a. Perform voltage source to current source conversions and current source to voltage source conversions.
   b. In circuits containing multiple resistors and sources, use the superposition theorem to solve for unknown voltages and currents.
   c. Through analysis, construction, and testing of an actual circuit, prove the validity of the superposition theorem.
   d. Reduce series–parallel resistive circuits to their Thevein's equivalent.
   e. Measure the Thevein's voltage and resistance of a DC circuit.
   f. Reduce series–parallel resistive circuits to their Norton equivalent.
   g. Measure the Norton current and Norton resistance of a series circuit.
   h. Perform conversions between Thevein's and Norton equivalent circuit.
   i. Explain the conditions under which maximum power occurs.
   j. Construct a circuit, and prove the maximum power transfer theorem.

8. Explain capacitance, and demonstrate its application in DC and transient circuits.
   a. Explain capacitance and terms related to capacitance.
   b. Explain the construction of a capacitor and its relationship to capacitance value.
   c. Draw the symbols for capacitance, and identify the unit of measurement for capacitance.
   d. Explain how the capacitor is charged and discharged.
   e. Identify various types of capacitors.
   f. Explain specifications of connections including values and voltage ratings.
   g. Calculate the total capacitance of capacitors in series and in parallel.
   h. Define and compute RC time constant.
   i. Measure capacitance in series and in parallel.
   j. Construct a circuit, and using an oscilloscope, display and measure the charge and discharge waveforms in a series RC circuit.
   k. Explain and demonstrate techniques for troubleshooting capacitors.

9. Explain inductance, and demonstrate its application in DC and transient circuits.
   a. Explain the laws of repulsion and attraction between two magnetic poles.

b. Explain how an electromagnet is developed.
c. Explain several applications of magnetism.
d. Define inductance and the terms relating to inductance.
e. Sketch the symbols for inductors, and identify the unit of measurements for inductance.
f. List the factors that determine the value of an inductor, and state whether the factors have a direct or inverse effect on the value.
g. Calculate total inductance in series and parallel.
h. Explain the Henry in terms of induced voltage and the rate of charge of current with respect to time.
i. Calculate the time constant for an RL circuit.
j. Fabricate and demonstrate the operation of an RL circuit.
k. Explain and demonstrate techniques for troubleshooting DC circuits.

Course Number and Name: **EET 1123** **AC Circuits**

Description: Principles and theories associated with AC circuits. This course includes the study of electrical circuits, laws and formulae, and the use of test equipment to analyze AC circuits

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:
Refer to the current curriculum for updated Student Learning Outcomes.

1. Analyze a sine wave, and explain its characteristics and application to AC circuits.
   a. Explain and calculate the following AC values: Period, frequency, time, angle, instantaneous values of voltage and current, peak, peak-to-peak voltage and current, RMS voltage and current, average voltage and current, and power.
   b. Analyze AC resistive circuits and solve for voltage drops, branch currents, and power dissipations.
   c. Explain and use phasors/vectors to represent the relative phase and amplitude of AC voltages and currents.
   d. Explain and use voltage and power decibels.
   e. Use the oscilloscope to measure AC voltage and frequency.
   f. Use a frequency counter to measure frequency.
   g. Use multimeters to measure AC voltage and current.
   h. Define the square and sawtooth waves in terms of harmonic content.
   i. Determine the duty cycle of a square wave.
   j. Determine period and frequency for sine waves, square waves, sawtooth waves, and triangle waves.

2. Analyze inductive and capacitive reactance in series and parallel circuits.
   a. Calculate inductive reactance (X_L) using Ohm's law or the inductive reactance formula when signal frequency and inductance are known.
   b. Solve for signal frequency when inductance and inductive reactance are known, or inductance when frequency and inductive reactance are known.
   c. Calculate capacitive reactance (X_C) using Ohm's law or the capacitive reactance formula when signal frequency and capacitance are known.
   d. Solve for signal frequency when capacitance and capacitive reactance are known, or capacitance when frequency and capacitive reactance are known.
   e. Calculate all voltages and currents in series and parallel capacitive and inductive circuits.

3. Analyze transformer voltage, current, impedance transformations, and applications.
   a. Explain how mutual inductance affects transformer action.
   b. Calculate primary and secondary transformer voltage and current as related to the transformer's turns ratio.
   c. Explain the theory of reflected impedance between the primary and secondary, or secondaries, of transformers.
   d. Calculate reflected impedance given a transformer turns ratio and secondary load impedance.
   e. Explain various transformer ratings, such as voltage, current, power, impedance, frequency, and efficiency.
   f. Explain various transformer losses, such as winding losses and core losses.

g. Discuss a variety of transformer types and applications.
h. Construct transformer circuits, and measure voltages and currents as calculated.
i. Troubleshoot a transformer using an ohmmeter and/or voltmeter.

4. Explain RLC non-resonant and resonant circuits.
   a. Use basic trigonometric functions and the Pythagorean theorem for right triangles in the analysis of AC circuits.
   b. Calculate impedance, current, voltages, and power for series RL, RC, and RCL circuits.
   c. Represent series AC circuits with voltage, impedance, and power phasors in phasor diagrams.
   d. Use an RL and RC circuit as a lead or lag circuit.
   e. Express phase relationships in terms of time.
   f. Explain and calculate AC circuit efficiency.
   g. Construct RC, RL, and RCL series circuits and use a dual-trace oscilloscope for sine-wave-voltage phase comparison.
   h. Calculate branch currents and total current for parallel RL, RC, and RCL circuits.
   i. Calculate the phase angle for each branch current and total current of a parallel AC circuit.
   j. Calculate real power, reactive power, apparent power, and the power factor for parallel AC circuits.
   k. Calculate the power efficiency of a parallel AC circuit.
   l. Correct the power factor of a parallel AC circuit by changing the size of L or C.
   m. Construct and analyze RC, RL, and RCL parallel AC circuits.
   n. Name applications for series and parallel resonant circuits.
   o. List all of the significant parameters and characteristics of series and parallel resonant circuits.
   p. Explain the characteristic graphs for series and parallel resonant circuits.
   q. Calculate the resonant frequency for series and parallel resonant circuits.
   r. Calculate circuit Q and bandwidth when the resonant frequency and total circuit resistance are known.
   s. Calculate bandpass when the resonant frequency and bandwidth are known.
   t. Calculate the proper size capacitor to resonate with a given inductor at a specified resonant frequency.
   u. Calculate the proper amount of total resistance needed to provide a specified bandwidth for a given series resonant circuit.
   v. Accurately test series and parallel resonant circuits using a variable-frequency generator and an oscilloscope.
   w. Explain similarities and differences between series and parallel resonance.

5. Explain and classify filters.
   a. Identify filters by type and configuration.
   b. Discuss and analyze filter types in terms of frequency response, phase response, insertion loss, and roll off shape.
   c. Discuss practical applications of each of the basic filter types.
   d. Predict and plot frequency response for common filter types using the insertion loss formula.
   e. Analyze RL, RC, and RCL high-pass filters.
   f. Analyze RL, RC, and RCL low-pass filters.
   g. Analyze series and parallel resonant band-pass filters.
   h. Analyze series and parallel resonant band stop filters.

Course Number and Name: **EET 1214** **Digital Electronics**

Description: Number systems, logic circuits, counters, registers, memory devices, combination logic circuits, Boolean algebra, and a basic computer system.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4			

Prerequisite: Instructor Approved

Student Learning Outcomes:
Refer to the current curriculum for updated Student Learning Outcomes.

1. Perform mathematical operations in digital number systems.
   a. Convert between binary, octal, hex, and decimal values.
   b. Add and subtract binary, octal, and hex numbers.
   c. Subtract binary numbers using both ones and twos complements.
   d. Generate and interpret even and odd parity.
   e. Use the terms bit, byte, MSB, LSB, and nibble appropriately.
   f. Encode and decode ASCII codes from code charts.

2. Classify logic gates, and explain their functions.
   a. Describe and complete truth tables for logic gates.
   b. Sketch schematic diagrams for logic gates.
   c. Solve timing diagrams for logic gates.
   d. Apply procedures to protect devices against electrostatic discharge (ESD).
   e. Wire and test logic gates.
   f. Write Boolean expression for logic gates.

3. Analyze logic circuits.
   a. Construct, develop, and interpret combinational logic circuits.
   b. Construct, develop, and interpret sequential logic circuits.

4. Minimize logic circuits using Boolean algebra and Karnaugh mapping.
   a. Write and describe the Boolean algebra theorems.
   b. Apply DeMorgan's theorem to convert between OR and AND logic.
   c. Apply Boolean algebra to minimize given Boolean expressions.
   d. Convert between sum of products and product of sums.
   e. Use Karnaugh maps to simplify Boolean expressions.

5. Analyze principles and operations of digital display devices.
   a. Construct and demonstrate seven-segment LED digital displays.
   b. Describe the principle at operation for multiplying multidigit displays.
   c. Contrast LED and LCD digital display devices.

6. Explain the operation of basic memory circuits.
   a. Describe the characteristics of memory types including static RAM, dynamic RAM, PROM, and EPROM.
   b. Interpret manufacturers' data sheets for memory integrated circuits.

Course Number and Name: **EET 1334** **Solid State Devices**

Description: Active devices that include PN junction diodes, bipolar transistors, bipolar transistor, circuits, and unipolar devices with emphasis on low –frequency application and troubleshooting.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes:
Refer to the current curriculum for updated Student Learning Outcomes.

1. Explain the characteristics of semiconductor materials and theory of operation of PN junctions.
   a. Explain basic atomic structure.
   b. Define intrinsic, P-type, and N-type.
   c. Analyze an unbiased PN junction.
   d. Analyze a forward-biased PN junction.
   e. Analyze a reverse-biased PN junction.

2. Explain semiconductor diode theory and apply to diode circuits.
   a. Describe the characteristics of a diode.
   b. Analyze and demonstrate a half-wave rectifier circuit.
   c. Analyze and demonstrate a full-wave rectifier circuit.
   d. Analyze and demonstrate a bridge rectifier circuit.

3. Analyze the operation of semiconductor special purpose diodes.
   a. Analyze and demonstrate the operation of a Zener diode circuit.
   b. Analyze and demonstrate the operation of a light-emitting diode circuit.
   c. Explain the characteristics of Schottky diodes.
   d. Explain the characteristics of varactor diodes.

4. Analyze the operation of bipolar junction transistors.
   a. Define and identify transistor voltages and currents.
   b. Analyze and demonstrate the operation of a DC common emitter circuit.
   c. Demonstrate the use of collector curves.
   d. Demonstrate the use of load lines.
   e. Explain and demonstrate base, emitter, and voltage divider biasing.

5. Explain and analyze the construction of BJT amplifiers.
   a. Analyze and discuss the basic operation of a common emitter voltage amplifier.
   b. Given a common emitter amplifier circuit, draw the AC equivalent circuit, and solve for V-in, V-out, and A.
   c. Explain how the swamped common emitter amplifier works, and discuss its advantages.
   d. Given a swamped common emitter amplifier circuit, draw the AC equivalent circuit, and solve for Z-in, V-in, V-out, and A.
   e. Construct a common emitter amplifier, and compare measured parameters to calculated values.

   f. Given a cascaded common emitter amplifier, calculate gain of stage one, gain of stage two, and output voltage.

g. Given a power amplifier circuit, solve for the maximum generator voltage that will produce an unclipped output signal, and solve the maximum efficiency of the amplifier.
h. Given an emitter-follower circuit, solve for Z-in, V-in, A, and V-out.
i. Describe the characteristics of a Class A power amplifier to include the factors that limit the power rating of a transistor.
j. Construct Class A and Class B amplifiers, and troubleshoot the circuits.

6. Analyze the operation of field effect transistors, and demonstrate their applications.
   a. Describe the basic construction of a JFET.
   b. Calculate the proportional pinch off voltage, and determine the operating area of a JFET.
   c. Given a JFET circuit, determine ID and Vds.
   d. Given a JFET amplifier circuit, draw the AC equivalent circuit, and solve for gmo, gm, Z-in, V-in, A, and V-out.
   e. Given a JFET source follower circuit, with a given gm, solve for V-in, A, and V-out.
   f. Illustrate the construction of and describe the operation of the depletion-mode and the enhancement-mode MOSFET.
   g. Analyze other FET applications, such as multiplying, switching, chopper, AGC, and sample and hold amplifier.

7. Analyze the operation of thyristors, and demonstrate their applications.
   a. Describe the four-layer diode, and discuss how it is turned on and off.
   b. Describe how the SCR operates in different applications.
   c. Construct a latching SCR with a varying input voltage, and determine when the output voltage is latched.
   d. Describe the main characteristics of the variations of the SCR, and discuss the difference in device symbols.
   e. Describe the characteristics of the diac and triac.
   f. Calculate the intrinsic standoff voltage for a unijunction transistor (UJT), and state how it works.
   g. Analyze thyristor applications, such as over voltage detector, sawtooth generator, SCR crowbar, and controlled SCR circuits phase angle controlled circuits.
   h. Construct thyristor circuits, and vary the latching parameters; measure the output to view switching and control of the device.

Course Number and Name: **EET 2354** **Solid State Motor Controls**

Description: The course covers the principles and operation of solid state motor control as well as the design, installation, and maintenance of different solid state devices for motor control.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4			

Prerequisite: Instructor Approved

Student Learning Outcomes:
Refer to the current curriculum for updated Student Learning Outcomes.

1. Apply general safety principles and safety requirements for working on and around electrical motors.
   a. Apply principles of safety in the use of electrical motors.
   b. Describe safety procedures to utilize during connecting and operating electric motors.

2. Troubleshoot solid-state motor controls.
   a. Identify electronic and industrial symbols used to represent logic gates in solid-state schematics.
   b. Describe the operation of the different types of industrial and electronic logic gates.
   c. Draw a solid-state logic circuit to replace a manual control station.
   d. Troubleshoot and repair/replace solid-state devices to include memory devices, flip/flops, adjustable time delays, starting and stopping sequences, and looping.

3. Operate AC and DC variable speed drives.
   a. Discuss the operation of a DC variable speed drive.
   b. Discuss the operation of an AC variable speed drive.
   c. Connect and operate DC and AC variable speed drives

Course Number and Name: **EET 2363** **Programmable Logic Controllers**

Description: This course covers use of programmable logic controllers (PLCs) in modern industrial settings as well as the operating principles of PLCs and practice in the programming, installation, and maintenance of PLCs

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:
Refer to the current curriculum for updated Student Learning Outcomes.

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

Course Number and Name: **EET 2414** **Electronic Communications**

Description: This course is designed to provide the student with concepts and skills related to analog and digital communications. Topics covered include amplitude and frequency modulation, transmission, and reception; data transmission formats and codes; and modulation-demodulation of digital communications

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4			

Prerequisite: Instructor Approved

Student Learning Outcomes:
Refer to the current curriculum for updated Student Learning Outcomes.

1. Explain the operation of the components of a communication system.
    a. Explain and demonstrate the operation of radio frequency (RF) amplifiers.
    b. Explain and demonstrate the operation of RF oscillators.
    c. Explain and demonstrate the operation of RF filters.
    d. Explain and demonstrate the operation of RF mixers.
    e. Explain and demonstrate the operation of a phase-locked loop.
    f. Demonstrate how these components are used together to implement a receiver and a transmitter.
2. Explain and perform signal and noise analysis.
    a. Convert between dB and voltage gain ratios and between dB and power gain ratios.
    b. Use dB and dBm to express the gain and power level of cascaded stages.
    c. Explain electrical noise and noise figures, and calculate noise figures for cascaded systems.
    d. Explain and calculate noise floor and signal to noise ratio for components and systems.
    e. Explain and use the power spectrum to represent RF signals.
3. Analyze and demonstrate the characteristics and operation of amplitude modulation (AM) systems.
    a. Explain and graph AM signals in time and frequency domains.
    b. Explain and calculate modulation index for AM.
    c. Explain AM generation and detection.
    d. Analyze and demonstrate an AM transmitter/receiver link.
    e. Explain and graph AM SSB signals in time and frequency domains.
    f. Explain AM SSB generation and detection.
    g. Analyze and demonstrate an AM SSB transmitter/receiver link.
4. Analyze and demonstrate the characteristics and operation of frequency modulation (FM) systems.
    a. Describe and graph FM signals in time and frequency domains.
    b. Explain and calculate modulation index for FM.
    c. Explain FM generation and detection.
    d. Explain stereo FM systems.
    e. Analyze and demonstrate an FM transmitter/receiver link.
5. Analyze and demonstrate the characteristics and operation of digital modulation.

a. Analyze and explain pulse modulation systems.
b. Analyze and explain frequency shift keying systems.
c. Analyze and explain phase shift keying systems to include BPSK, QPSK, and higher orders.
d. Analyze and explain quadrature amplitude modulation systems to include higher orders.
e. Analyze and explain error correcting codes.

6. Analyze and explain the characteristics of wave propagation, antennas, and transmission lines.
    a. Explain the characteristics of a transmission line, and represent it by an equivalent circuit.
    b. Explain wave propagation through transmission lines.
    c. Explain wave reflections and standing waves in transmission lines.
    d. Analyze and demonstrate electromagnetic wave propagation.
    e. Analyze and explain the characteristics of various types of antennas.

Course Number and Name: **EET 2423** **Fundamental of Fiber Optics**

Description: This course is a capstone course for Fiber-optic cable in modern applications

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Demonstrate and practice general safety procedures in the school and work-site environments.
    a. Apply relevant and appropriate safety techniques.
    b. Demonstrate an understanding of and comply with relevant OSHA safety standards.
2. Describe the history and advantages of fiber-optic systems.
    a. Describe the limitations of wire communications systems.
    b. Describe the technical developments making optical fiber communications feasible to include bandwidth capabilities.
    c. List the advantages of optical fiber communications over electrical wire communications.
3. Explain the operation and application of optical signal sources.
    a. Apply appropriate safety practices to optical signal sources.
    b. Explain the advantages and disadvantages of LEDs as optical signal sources.
    c. Describe the principle of operation of semiconductor lasers.
    d. Explain the advantages and disadvantages of lasers as optical signal sources.
    e. Explain the operation of modulator circuits for optical signal sources.
4. Explain the operation and application of fiber-optic system components.
    a. Describe the construction of optical fibers.
    b. Explain optical fiber cable specifications.
    c. Describe the operation of detectors used in fiber-optic systems.
    d. Explain the operating principle and purpose of transceivers and repeaters.
5. Explain the theory of light propagation in vacuum and in optical fiber.
    a. Explain the modes of optical fiber light transmission.
    b. Describe the light loss mechanisms that occur in optical fibers.
    c. Describe the use of Snell's law as it relates to fiber optics.
    d. Describe dense wavelength division multiplexing (DWDM).
6. Describe properties of different types of optical fibers.
    a. Differentiate between the properties and characteristics of plastic and glass optical fibers.
    b. Describe the effect of core size on efficiency and bandwidth.
    c. Describe fiber-optic cables available for indoor and outdoor installation.
    d. Prepare and complete a splice of fiber-optic cable following industry standards and safety procedures.

Course Number and Name: **MEC 1113** **Mechanical Maintenance**

Description: This course provides instruction on the basic principles of mechanical systems, bearings, seals and packing, gaskets, gears, couplings, shims, jigs, equipment alignment, belt and chain drives, and fans and blowers

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Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Student Learning Outcomes:

Refer to the current curriculum for updated Student Learning Outcomes.

1. Describe the basic principles of mechanical systems and the six simple machines.
2. Differentiate between various lubricants and describe viscosity.
3. Explain how to remove, install, and maintain different types of bearings.
4. State the function, installation, and maintenance of seals, packing, and gaskets.
5. Describe the use, installation, and alignment of various couplings and gears.
6. Explain how to perform shaft and coupling alignment and reverse alignment with the use of fixtures.
7. Explain the use and types of shims.
8. Describe the application, installation, and maintenance of various belt and chain drives.
9. Explain the principles of operation and maintenance of various types of fans and blowers.

Course Number and Name: **MMT 2213** **Principles of Management**

Description: This course is a study of basic management principles as applied to the function of planning, organizing, directing, controlling, and coordinating with effective communication in business.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Analyze the functions of management.
   a. Identify and define the basic parts of the planning process.
   b. Identify and describe the major components of organization.
   c. Name and apply the major components of staffing.
   d. Explore the primary styles of leadership.
   e. Identify and classify the basic motivational theories.
   f. Examine the different types of organizational communications.
   g. Define the steps of the control process.
   h. Identify and apply the basic control methods and techniques.
   i. Identify problem solving techniques.

2. Assess a code of acceptable business ethics.
   a. Evaluate the use of proper business ethics.
   b. Explore different business ethics in various cultures.

Course Number and Name: **MTA 100 (1-6) Supervised Work Experience**

Description: The supervised work experience will be performed in an on-the-job training setting related to the apprentice's major field of study. This course is designed for the on the job application of various industrial and educational skills with the integration of the apprentice's technical studies and industrial experience.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
1	0	2	30
2	0	4	60
3	0	6	90
4	0	8	120
5	0	8	120
6	1	10	165

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply technical skills needed to a viable member of the workforce.
    a. Prepare a description of technical skills to be developed in the supervised work experienced program.
    b. Develop technical skills needed to be viable member of the workforce.
2. Apply skills developed in other program area courses.
    a. Perform skills developed in other program area courses in the supervised work experience program.
3. Apply human relationship skills.
    a. Practice human relationship skills in the supervised work experience program.
4. Apply and practice positive work habits and responsibilities.
5. Work with the instructor and employer to develop written occupational objectives to be accomplished.
    a. Perform written occupational objectives in the supervised occupational experience program.
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.

Course Number and Name: **MTA 1113** **Occupational Math**

Description: This course provides an introduction to fundamentals of general math, basic algebraic operations, plane geometry, and application of trigonometric functions. It also includes instruction in the principles of measurement and practice with the steel ruler.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate basic math operations as they relate to:
    - Whole numbers
    - Common fractions
    - Decimal fractions
    - Percent
    - Signed numbers
2. Apply measurement techniques and tolls using
    - Precision, accuracy, and tolerance
    - Customary measurement units
    - Metric measurements units
    - Steel ruler and Vernier calipers
3. Evaluate algebraic expressions and apply formulas to solve problems utilizing
    - Basic algebraic operations
    - Simple equations
    - Complex equations
4. Apply basic geometric principles to solve area and volume problems with
    - Angular measurement
    - Triangles
    - Circles
5. Application of trigonometric functions.

Course Number and Name: **MTA 1122 Carpenter Shop I**

Description: This course will provide the student with the basic carpenter skill sets using basic hand and power tools with practical applications applied in the field and the carpenter shop, within a marine environment.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
2	0	4	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss and apply general carpenter shipbuilding and shop safety.
2. Identify, safely utilize, and maintain hand and carpenter shop tools.
3. Explain and demonstrate responsibilities and tasks of the carpenter craftsman in the shipbuilding industry.

Course Number and Name: **MTA 1133** **Carpenter Shop II**

Description: This course will provide the student with intermediate carpenter skill sets with practical applications applied in the field while working to erect scaffolding and shoring/blocking, with a marine environment. In addition, the course explains Occupational Safety and Health Administration (OSHA) safety regulations and tagging procedures.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Recall industry and OSHA safety regulations for scaffolding in the shipbuilding industry.
2. Explain required tagging system for scaffolding and ladders.
3. Describe and demonstrate procedures for safe erection and dismantling of system scaffolding in the shipbuilding industry.
4. Describe and demonstrate procedures for button-lok scaffold installation.
5. Describe and demonstrate the blocking and shoring system in shipbuilding.
6. Explain the ship translation process.

Course Number and Name: **MTA 1143** **Blueprint Reading for Carpenter**

Description:

This course is a comprehensive guide to interpreting drawings commonly found in the shipbuilding industry. The students will develop an understanding of the different types, sizes, and parts of various drawings related to their trade. Abbreviations and symbols related to the shipbuilding industry along with a brief introduction of laying out, cutting, shaping and fitting keel blocks; correct placements of vertical and incline ladders; hatch guard and lifeline placement and installation on marine type drawings that will be provided. General shipbuilding terminology, orientation, deck levels, compartments, and shipboard equipment will be introduced. Successful completion of this course will give the student a general knowledge of the drawings used in the shipbuilding industry and enhance the student's productivity.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Student Learning Outcomes:

1. Develop a basic understanding of the shipbuilding industry.
    a. Define terms associated with the shipbuilding industry.
    b. Identify and describe the major parts and components of a ship.
    c. Identify and describe the various reference lines used on a ship.
    d. Understand shipboard orientation.
2. Develop a basic understanding of marine drawings used in the shipbuilding industry.
    a. Identify and interpret the various lines that make up the views on a drawing.
    b. Identify and describe the industrial methods for showing dimensions and tolerances.
    c. Identify and describe the different views used on a drawing.
    d. Identify and describe the different reference lines used on a drawing.
    e. Understand the orthographic and isometric views used on a drawing.
3. Develop a basic understanding of the different documents used in the shipbuilding industry.
    a. Understand the use of a rip out procedure.
    b. Understand the use of an engineering change paper.
    c. Understand the use of a work order.

Course Number and Name: **MTA 1153 Introduction to Shipbuilding and Blueprint Reading**

Description: This course emphasizes the essentials required to successfully interpret blueprints and the techniques, views, layouts, dimensioning and symbols used on blueprints for the maritime industry. Additional focus is on terminology, planning, and processes of ship construction, and the evolution of ship design.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Develop a basic understanding of the shipbuilding industry.
   a. Identify and describe the different types of metals ships.
   b. Define terms associated with the shipbuilding industry.
   c. Differentiate between conventional ship construction and modular construction processes.
   d. Identify and describe the major parts of a ship, and discuss their relationship and function.
   e. Contrast manual and computerized methods for lofting of ship drawings.
2. Identify terms, symbols, lines, and views used in blueprints for various disciplines.
   a. Define welding symbols used in ship blueprints.
   b. Identify the three basic views of a drawing.
   c. Identify the various lines used on drawings.
   d. Interpret dimensions and symbols.
   e. Interpret general and specific notes on drawings.
   f. Locate features on drawings.
3. Identify describe, and apply dimensions and tolerances.
   a. Identify, describe, and apply industrial methods for showing dimensions and tolerances.
   b. Describe and apply the International System of Units (SI) as used in plans.
   c. Describe and apply the need for metric dimensioning.
   d. Describe and apply specifications found on plans.
4. Understand the orthographic and isometric views.
   a. Understand the visualization of an object.
   b. Develop a sketch of an isometric drawing.
   c. Sketch the various orthographic views of an object from an isometric view.
5. Identify, distinguish, and apply primary and secondary auxiliary views on a drawing.
   a. Identify, distinguish, and apply primary and secondary auxiliary views on a drawing.
   b. Identify, describe, and apply surface finishes shown on a plan.
   c. Identify materials used as indicated by section lines, and demonstrate correct selection.
   d. Describe and apply the use of the cutting plane line.

Course Number and Name: **MTA 1163** **Advanced Pipe Welding**

Description: The Advanced Pipe welding course will provide an introduction to general safety considerations that apply to welding .and metal cutting, welding symbols, reading welding detail drawings, welding quality, base metal preparation, physical characteristics and mechanical properties of metals and preheating and post weld heat treatment of metals. It will continue with plasma arc cutting, shielded metal arc welding (SWAW) stainless steel groove welds, and principles of safe oxyfuel cutting, It finishes with gas metal arc welding and flux-cored arc welding (FCAW) equipment and filler metals, FCAW- pipe, and air carbon arc cutting (CAC-A) and gouging. Lab exercises will be comprehensive and will be concentrated in the latter half of the course.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Student Learning Outcomes:

1. Demonstrate ability to use safety equipment, protective clothing and procedures applicable to the pipe welding craft.
2. Demonstrate specific welding and cutting processes to include proper setup and operations.
3. Demonstrate ability to property read technical drawings as they relate to welding.
4. Demonstrate ability to perform proper techniques in mirror welding.
5. Demonstrate ability to weld various types of pipe joints in the 6 GR position.
6. Explain basic safety, setup and operation of carbon arc gouging and plasma arc cutting.
7. Demonstrate ability to perform basic gouging and cutting operations on various types of materials with both carbon arc gouging and plasma arc cutting.
8. Explain operation set up for open root pipe joint design.

Course Number and Name: **MTA 1174** **Introduction to Paint**

Description: This course provides the fundamentals of paint and coatings processes and procedures as they relate to shipbuilding. It reviews industry standards, safety, quality and processes including basic abrasive blasting, spray painting, brush painting and rolling, machine cleaning, masking, and de-masking.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Describe all aspects of safety pertaining to Paint/Coatings Department for New-Hire Apprentice
2. Describe SSPC-SP Surface Preparation Cleaning Levels
3. Explain all aspects of the Abrasive Blasting Process
4. Identify and describe all aspects of the Airless Spray Pump Process
5. Summarize all aspects of Brush Painting and Rolling
6. Review all aspects of Machine Cleaning, Masking and De-Masking
7. Distinguish all material necessary to perform each duty required by a painter
8. Obtain Man lift Certification

Course Number and Name: **MTA 1183** **Introduction to Joiner and Sheet Metal**

Description: This course provides the basic skills needed in order to perform as an entry level Joiner Apprentice. The course begins with the use of basic tools, interpreting tape measures, power tools, ship navigation and introduction to blueprints.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate the basic math operations such as they relate to
   a. Whole numbers
   b. Common fractions
   c. Decimal
   d. Decimal fractions
   e. Rule Reading
2. Demonstrate the basic of blue print interpretation:
   a. Parts of blue prints
   b. Lines found on blue prints
   c. Basic ship layout
3. Demonstration of tolls of the trade:
   a. Metal working hand tools
   b. Metal working power tools
   c. Metal working shop tools
4. Identify and describe various types of metal
   a. Aluminum
   b. Mild steel
   c. Stainless steel
5. Identify and distinguish they types of fasteners used with different types of metals
   a. Rivets
   b. Welding
   c. Jack nuts
   d. Types of screws
6. Describe basic shapes formed when working with metals
   a. Forming, crimping, beading and grooving
   b. Folding edges, making seams
   c. Punching, drilling burring
   d. Basic layout
7. Review of different jobs within the joiner field
   a. Parts of bulk storage

Course Number and Name: **MTA 1194 Rigger Shop I**

Description: Rigger Shop I introduces rigging communications, basic principles of cranes, crane safety, basic rigging, rigging equipment and rigging practices.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Communicate effectively at the jobsite with management, the crew, and the crane operator.
2. Demonstrate the standard hand signals as specified in the ASME Standards.
3. Describe the signaling procedures used when multiple signal persons are required.
4. Identify the types of mobile cranes found on construction sites.
5. Identify the capabilities of mobile cranes found on construction sites.
6. Identify the crane safety precautions associated with rigging.
7. Identify the use of slings and common rigging hardware that are used on the jobsite.
8. Describe the operations and practices used to perform a safe rigging operation.
9. Demonstrate the selection, use, and maintenance of common and special rigging hardware.
10. Describe the safety considerations that are to be observed while performing rigging operations on the jobsite.
11. Identify the conditional issues that are to be observed while performing rigging operations on the jobsite.

Demonstrate rigging procedures on the jobsite

Course Number and Name: **MTA 1214** **Rigger Shop II**

Description: Rigger Shop II introduces intermediate rigging, wire rope, boom assembly and disassembly, and basic principles of cranes.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Explain the considerations associated with rigging practices.
2. Describe the basic elements of a lift plan.
3. Describe the cranes and components in each category.
4. Explain the purpose of a load chart.
5. Describe how special equipment is used for lateral movement of loads.
6. Describe the construction and characteristics of wire rope.
7. Explain the inspection criteria and maintenance requirements of wire rope.
8. Describe the procedures, methods, and advantages of reeving wire rope.
9. Explain the considerations associated with boom assembly and disassembly.
10. Identify the component parts of a lattice boom and jib assembly.
11. Describe the operations and steps used to assemble and disassemble a boom/jib.
12. Identify the types of mobile cranes found on construction sites.
13. Identify the capabilities of mobile cranes found on construction sites.
14. Describe the practices of blueprint reading as it relates to rigging operations.

Course Number and Name: **MTA 1223** **Blueprint Reading for Shipfitter**

Description: This course is an introduction to the fundamentals of blueprints, reading, interpreting, and understanding blueprints. The students will develop an understanding of the different types, sizes, and parts of various drawings as they relate to the shipfitting craft.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Explain duties of various symbols and lines
2. Demonstrate the use of symbols and lines
3. List and identify the major components of a blueprint
   a) Abbreviations and Symbols
   b) Basic Lines
   c) Orthographic Principles, View Relations, Visualization
   d) Notes, Specification
   e) Revision
   f) Index
   g) key plan
   h) References
   i) Dimensions
   j) Title Block
   k) Sheet Zone
   l) Port, Starboard, Forward, Aft, Center Line
   m) Ship relations to Longitudinal, Frames, Deck Levels
4. Describe the difference between drawings
   a) Standard vs metric
   b) Sheet numbering
5. Differentiate the drawing views
6. Navigate the drawings revisions
7. Reading and understanding drawings

Course Number and Name: **MTA 1233** **Flux Cored Arc Welding**

Description: This course is designed to give the student experience using the FCAW process

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

Equipment and Filler Metals

a. Explain gas metal arc welding flux-cored arc welding (FCAW) safety
b. Explain the characteristics of welding current and power sources
c. Identify and explain the use of FCAW equipment: Spray transfer, Globular, Short circuiting, Pulse
d. Identify and explain the use of FCAW shielding gases and filler metals
e. Set up FCAW equipment and identify tools for weld cleaning

Plate

a. Perform FCAW multiple-pass fillet welds on carbon steel plate coupons in multiple positions, using flux-cored wire and, if required, shielding gas
b. Perform FCAW multiple-pass V-groove welds on carbon steel plate coupons in multiple positions (with or without backing), using flux-cored wire and, if required, shielding gas.

Weld Quality

a. Identify and explain codes governing welding
b. Identify and explain weld imperfections and their causes
c. Identify and explain nondestructive examination practices
d. Identify and explain welder qualification tests
e. Explain the importance of quality workmanship
f. Identify common destructive testing methods
g. Perform a visual inspection of fillet welds

Course Number and Name: **MTA 1244** **Introduction to Shipfitting**

Description: This course is designed to provide students an introduction to shipfitting, which includes classroom training, welding certification, and hands-on application. This course covers safety equipment, protective clothing, and procedures applicable to the cutting and welding of metals. Also covered will be proper procedures to clean and prepare base metals, joint design and welding tasks. Oxy fuel is covered in the process of burning and washing. Shielded metal arc welding (SMAW) and flux cored arc welding (FCAW) techniques along with applicable codes will also be covered. Filler metals and weld testing is also included

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Discuss and demonstrate various elements of shipbuilding safety
2. Explain and apply basic math used in shipfitting
3. Interpret and use various elements of a ship
4. Explain and use components of drawings and blueprints
5. Discuss tools commonly used in shipfitting and demonstrate their proper use
6. Discuss and perform practical application of shipfitting and first time quality
7. Explain and perform burning and washing
8. Describe and apply base metal preparation
9. Explain and use equipment and setup
10. Discuss and perform shielded metal arc welding (SMAW) and flux cored arc welding (FCAW)
11. Discuss and perform SMAW and FCAW beads and fillet welds
12. Explain and demonstrate weld quality

Course Number and Name: **MTA 1254 Journeyman Essentials for Shipfitters**

Description: The first half of this course provides instruction in flame cutting methods including layout and cutting bevels, chamfers, and circles; as well as methods used to cut or split common structural components such as beams and bars. Also covered is plasma arc cutting methods and safe practice of equipment and work area preparation. The second half of this course focuses on accuracy control and provides instruction in basic level surveying, reference control lines, and recording and interpreting data on check sheets. In addition, instruction on using the Constructional and Erection Guide book and the Dimensional Control Construction Guidance (DCCG) is provided.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Describe proper safety practices using personal protection equipment; avoiding welding fumes; storing and handling gas cylinders; avoiding electric shock; and proper material handling methods.
2. Explain process for set up and safe use of oxyfuel equipment, and how to layout and cut various shapes.
3. Describe the techniques to layout and cut bevels, chamfers, and circles.
4. Identify and interpret elements of structural drawings with focus on development of orthographic and isometric views.
5. Summarize proper fit procedures using packing, gasket materials, and structural accessories.
6. Define how Reference Control Lines (RCLs) are used to stack, block, and erect units during the vessel construction process.
7. Describe the instrument and steps used in basic level surveying.

Course Number and Name: **MTA 1263** **Journeyman Essentials for Welders**

Description: This course will familiarize the Apprentice with information and knowledge about weld cost, definitions, and terms, welding joint design, filler metal selection, welding symbols, visual inspections, and weld defects. In addition, this course will provide the student with the understanding of work orders and physical progression. This course provides welding Apprentices with classroom and workshop training for behaviors and methods to enhance their capabilities to become first class welders

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Explain how various weld procedures increase or decrease cost of welding
2. Examine a weld and determine if it is acceptable based on visual inspection
3. Understand the basics of joint design
    a. List the five major types of joints
    b. List seven types of weld grooves
    c. Identify the major parts of a welding symbol
    d. Explain the parts of a groove preparation
    e. Describe how nondestructive test symbols are used
4. Explain how and when to use each type of filler metal
    a. Select the best filler metal to fi a specific welding job
    b. List the forms filler metals come in
    c. Explain the significance of the filler metal prefixes
    d. Explain how to interpret the standard filler metal numbering systems
5. Explain how the amount of progress accomplished for physical work completed on a work order is determined
6. Explain the elements of and effectively scope a work order

Course Number and Name: **MTA 1283 Layout II**

Description: An intermediate class for the hands-on fundamentals of layout, cutting, forming, and fabrication of sheet metal.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Demonstrate safety in the sheet metal shop and on the job
2. Recognize and correct safety hazards in the sheet metal shop
3. Explain and demonstrate sheet metal layout processes
4. Layout sheet metal patterns based upon simulated drawing requirements
5. Fabricate sheet metal designs from layout patterns

Course Number and Name: **MTA 1293** **Layout III**

Description: This course is designed as an advanced class for the hands-on application of layout, cutting, forming and fabrication of sheet metal.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Demonstrate safety in the sheet metal shop and on the job.
2. Apply Manufacturing Aids Lists to validate material requirements for fabrication of sub-assembly drawings.
3. Layout sheet metal patterns based upon shipboard sub-assembly drawing requirements.
4. Fabricate sheet metal designs from layout patterns.
5. Demonstrate the ability to tack weld the fabricated sheet metal.

Course Number and Name: **MTA 1314 Power Machinery**

Description: This course provides instruction in general machine shop procedures and shop safety. Students are introduced to turning, milling, and drilling operations, as well as job planning.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Identify general shop procedures and safety regulations.
2. Explain machining operations of turning, drilling, and milling.
3. Identify taps and threads and their tapping procedures.
4. Recognize the correct set-up process for turning, drilling, and milling operations.
5. Describe project layout using various layout instruments.
6. Identify drill bits and their sharpening methods.
7. Explain the benefits and list the steps of job planning.

Course Number and Name: **MTA 1323** **Precision Layout**

Description: An introduction to the concepts and practice of precision layout for machining operations. Includes instruction and practice in the use of layout instruments.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Discuss and apply general machine shop safety.
    a. Identify, discuss, and test safety procedures.
    b. Demonstrate safety procedures.

2. Identify precision layout instruments.
    a. Describe the use of instruments used for precision layout.
    b. Explain safety precautions.
    c. Explain upkeep and preventive maintenance.

3. Perform precision layout safely.
    a. Explain the steps in layout.
    b. Perform a precision layout to specifications and tolerances.

Course Number and Name: **MTA 1333 Safety for Welders**

Description: This course is designed to provide a development of knowledge and skills to reinforce attitudes and behaviors required for safe and environmentally sound work habits. Emphasis is placed on Safety Health and Environment al issues in the performance of all job tasks and regulatory compliance issues.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Describe various types of physical hazards commonly found in process industries for welding.
2. Describe the chemical hazards in process industries for welding.
3. Describe the biological, ergonomic and plant specific hazards associated with various processes.
4. Describe the environmental hazards in process industries.
5. Identify the various Engineering controls used to make process areas safe.
6. Discuss the various Administrative controls – Programs and Practices.
7. Describe the importance and application of PPE in process industries.
8. Describe the important role OSHA plays in the process industries.
9. Describe the important role EPA (state and federal) plays in process industries.
10. Describe the other regulatory agencies that impact the Process Industry.
11. Discuss general rules for working in confined spaces and dangerous atmospheres.
12. Describe the process for preparing and performing hot work.
13. Summarize the purpose and safety measures for the lockout/tags plus process.
14. Explain the purpose of the incident response team and the elements on the first aid checklist.

Course Number and Name: **MTA 1344 Shielded Metal Arc Welding (SMAW)**

Description: This course is designed to teach students introductory welding techniques using the SMAW process.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Base Metal Prepartation
   a. Clean base metal for welding or cutting
   b. Identify and explain joint design
   c. Explain joint design considerations
   d. Mechanically bevel the edge of a mild steel plate
   e. Thermally bevel the end of a mild steel plate
   f. Select the proper joint design based on a welding procedure specification (WPS) or instructor direction
2. Equipment and Setup
   a. Clean base metal for welding or cutting.
   b. Identify and explain joint design
   c. Explain joint design considerations
   d. Mechanically bevel the end of a mild steel plate
   e. Select the proper joint design based on a welding procedure specification (WPS) or instructor direction.
3. Equipment and Setup
   a. Identify and explain shielded metal arc welding (SMAW) safety
   b. Explain welding electrical current
   c. Identify welding power supplies and their characteristics.
   d. Explain how to set up welding power supplies
   e. Set up a machine for welding
   f. Identify tools used for weld cleaning
4. Shielded Metal Arc Welding Electrodes
   a. Identify factors that affect electrode selection
   b. Explain the American Welding Society (AWS) and the American Society of Mechanical Engineers (ASME) filler metal classification system.
   c. Identify different types of filler metals.
   d. Explain filler metal traceability requirements and how to use applicable code requirements.
   e. Identify and select the proper electrode for an identified welding task.
5. SMAW Beads and Fillet Welds
   a. Set up shielded metal arc welding (SMAW) equipment
   b. Describe methods of striking an arc
   c. Properly strike and extinguish an arc
   d. Describe causes of arc blower and wander
   e. Make stringer, weave, ad overlapping beads
   f. Make fillet welds in the following position Horizontal (2f), Vertical (3f), Overhead (4f)
6. Welding Quality
   a. Identify and explain codes governing welding
   b. Identify and explain weld imperfections and their causes
   c. Identify and explain nondestructive examination practices
   d. Identify and explain welder qualification tests
   e. Explain the importance of quality workmanship
   f. Identify common destructive testing methods

g. Perform a visual inspection of fillet welds

Course Number and Name: **MTA 1354 Weld Theory and Techniques**

Description: This course provides an introduction to welding and welding techniques. Topics include safety, welding and cutting processes, shop math, welding metallurgy, and weldability of metals, reading technical drawings, fabrication, certification, testing and inspection of welds, welding joint design, costs, and welding symbols.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Describe safety equipment, protective clothing, and procedures applicable to the pipe and hull crafts.
2. Given proper materials and equipment, demonstrate specific welding and cutting processes to include proper setup and operations.
3. Solve basic welding fabrication math problems using round numbers, mixed units, fractions, reduced fractions, and decimals.
4. Demonstrate ability to properly read technical drawings as they relate to welding.
5. Explain the basics of welding joint design.
6. Identify the major parts of a welding symbol.
7. Given a list of materials and equipment, discuss fabrication techniques and practices of welding and their impact on cost.
8. Explain qualification, certification procedures, code of standard, and common codes used in welding.
9. Given sample welds, accurately identify steps required for testing and inspection of welds.
10. Describe welding metallurgy as it relates to welding crafts.
11. Describe the fundamentals of weldability of metals.
12. Explain the use and significance of filler metals.

Course Number and Name: **MTA 1373 Blueprint Reading for Insulation**

Description: This course is a comprehensive guide to interpreting drawings commonly found in the defense industry. The students will develop an understanding of the different types, sizes, and parts of various drawings. Piping, HVAC, Hull Insulation and symbols will be presented. This course will provide Insulation Apprentices with basic information needed to install marine insulation on naval contracts and introduce computer and blueprint navigation using marine insulation blueprint.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Explain duties of various symbols and lines
2. Demonstrate the use of symbols and lines
3. List and identify the major components of a blueprint
4. Differentiate the drawing views
5. Identify, describe, and apply dimensions
6. Read and interpret the vast majority of Insulation prints
    a. Pipe Insulation
    b. Ventilation Prints
    c. Hull Insulation

Course Number and Name: **MTA 1384** **Blueprint Reading for Joiner**

Description: This course is an introduction to the fundamentals of blueprints, reading, interpreting, and understanding blueprints. The students will develop an understanding of the different types, sizes, and parts of various drawings as they relate to the joiner craft.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Explain duties of various symbols and lines
2. Demonstrate the use of symbols and lines
3. List and identify the major components of a blueprint
    a. Abbreviations and Symbols
    b. Basic Lines
    c. Orthographic Principles, View Relations, Visualization
    d. Notes, Specification
    e. Revision
    f. Index
    g. Key plan
    h. References
    i. Dimensions
    j. Title Block
    k. Sheet Zone
    l. Port, Starboard, Forward, Aft, Center Line
    m. Ship relations to Longitudinal, Frames, Deck Levels
4. Describe the difference between drawings
    a. Standard vs metric
    b. Sheet numbering
5. Differentiate the drawing views
6. Navigate the drawings revisions
7. Reading and understanding drawings

Course Number and Name: **MTA 1393 Blueprint Reading for Machinist**

Description: This course is a comprehensive guide to interpreting drawings commonly found in the shipbuilding industry. The students will develop an understanding of the different types, sizes, and parts of various drawings related to their trade. Abbreviations and symbols related to the shipbuilding industry along with a brief introduction of Geometric Dimensioning and Tolerance (GD&T) and its proper application in a drawing will be provided. General shipbuilding terminology, orientation, deck levels, compartments, and shipboard equipment will be introduced. Successful completion of this course will give the student a general knowledge of the drawings used in the shipbuilding industry and enhance the student's productivity.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Develop a basic understanding of the shipbuilding industry.
    a. Define terms associated with the shipbuilding industry.
    b. Identify and describe the major parts and components of a ship.
    c. Identify and describe the various reference lines used on a ship.
    d. Understand shipboard orientation.
2. Develop a basic understanding of marine drawings used in the shipbuilding industry.
    a. Identify and interpret the various lines that make up the views on a drawing.
    b. Identify and describe the industrial methods for showing dimensions and tolerances.
    c. Identify and describe the different views used on a drawing.
    d. Identify and describe the different reference lines used on a drawing.
    e. Understand the orthographic and isometric views used on a drawing.
3. Develop a basic understanding of the different documents used in the shipbuilding industry.
    a. Understand the use of a rip out procedure.
    b. Understand the use of an engineering change paper.
    c. Understand the use of a work order.

Course Number and Name: **MTA 1413** **Blueprint Reading for Pipe**

Description: Blueprint Reading for Pipe will review basic blueprint reading and provide an introduction to principles of reading a blueprint, modification of the three-view principle, views on a drawing, differences in contract drawings, phase II drawing documentation, ripout control process, steel pipe, pipefitting, flange basics, valves, mechanical equipment, flow diagrams and instrumentation, codes and specifications, equipment layout, piping arrangement drawings, sections and elevations, piping systems, and piping isometrics.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Recall highlights of Basic Blueprint Reading course
2. Give examples of drawing documentation
3. Accurately restate ripout control requirements and process
4. Recognize and explain marine views on a drawing
5. Describe differences in contract drawings
6. Explain pipe craft drawings as they relate to contracts
7. Discuss the progress of steel pipe as it has evolved over time
8. Properly identify the components of pipe fittings
9. Discuss in detail the basic types and uses of the flange
10. Outline the types and operations of valves
11. Outline parts of a flow diagram
12. Identify and discuss piping codes and specifications
13. Summarize equipment layout requirements
14. Describe aspects of piping arrangement drawings
15. Recognize the special functions of piping systems
16. Correctly identify drawings symbols in a flow diagram

Course Number and Name: **MTA 1423** **Fundamentals of Logistics**

Description: This course is designed to give the student a firm foundation in the systems approach to managing activities associated with forecasting, procurement, inventory management, life cycle costing, and product support.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Introduction and development of logistics management.
    a. Identify deregulation policies and issues.
    b. Discuss military logistic policies and procedures.
    c. Evaluate competitive pressures.
    d. Explore channel power and profit leverage issues.
2. Explore global box theory of logistics.
    a. Discuss the role of logistics in the economy.
    b. Identify the role of logistics in an organization.
3. Explain the types of customer service activities.
    a. Discuss and explain elements of customer service.
    b. Demonstrate procedures related to Box 2-1, Technology Box, Box 2-2, and Global Box methods of service.
4. Identify logistic information systems.
    a. Discuss customer order cycles.
    b. Read, comprehend, and apply sales and telemarketing information.
    c. Read and comprehend inventory management skills and techniques.
5. Explore managing materials flow and transportation systems.
    a. Discuss production control procedure.
    b. Explore forecasting, warehouse, storage, and inventory control procedures.
6. Identify purchasing and global logistics systems.
    a. Identify purchasing techniques.
    b. Explore global logistics systems

Course Number and Name: **MTA 1433** **Transportation and Distribution**

Description: This course is designed to give an overview of transportation and distribution issues. Emphasis is placed on domestic and international transportation, third-party selection, regulations, route and schedule development, and planning for shipments.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Introduction to the role and importance of transportation in our world.
   a. Understand transportation, the supply chain, and the economy.
   b. Examine the transportation regulations and public policy.
2. Explore transportation providers
   a. Discuss the varieties of carriers.
   b. Review the advantages and disadvantage of the carriers.
3. Identify transportation management strategies.
   a. Discuss shipper strategies and processes.
   b. Explore cost and pricing of the different transportation methods.
   c. Explore forecasting as it relates to management, data, and seasonality.

Course Number and Name: **MTA 1443** **Material Management**

Description: This course provides managerial information concerning inventory information systems, managerial tools and techniques, the warehouse environment, and distribution planning and control.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Introduction to materials management
   a. Understand how materials move in relation to the supply chain.
   b. Discuss sales and operations systems.
   c. Explore enterprise resource planning and making a production plan.
2. Explore master scheduling and material planning.
   a. Explain planning, master schedules, and sales.
   b. Identify material requirement process.
3. Identify capacity management and production activity control.
   a. Discuss and explain elements related to capacity planning and scheduling orders.
   b. Apply techniques to solve bottlenecks.
   c. Explore forecasting as it relates to management, data, and seasonality.
4. Identify planning and managing systems.
   a. Discuss cycle of ordering to keep up with demands.
      time manufacturing, and total quality management.
   b. Discuss and apply principles of inventory and warehouse management, distribution, just in time manufacturing, and total quality management.

Course Number and Name: **MTA 1453 Purchasing**

Description: This course provides information about the purchasing function. Emphasis is placed on vendor analysis, negations, system contracts, public and marine purchasing, competitive bidding, and personnel

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Explore the role of purchasing in supply chain management.
   a. Discuss purchasing operations.
   b. Analyze various purchasing structures.
   c. Describe critical supply chain elements involved in purchasing.
   d. Summarize strategic sourcing.
   e. Assess purchasing measurement categories.

Course Number and Name: **MTA 1463** **Supply Chain Management**

Description: This course provides information concerning the flow of products and information among producers, suppliers, and customers. Emphasis is placed on acquiring, purchasing, and distribution of goods and services throughout the supply chain.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Introduction and development of supply chains.
   a. Understand supply chain operation and management.
   b. Discuss strategic fit and scope of supply chain.
   c. Evaluate chain drivers and metrics.
2. Explore supply chain network design.
   a. Discuss distribution networks and application to e-business.
   b. Identify network designs and supply chains as they relate to an uncertain environment.
3. Explain planning demand and supply.
   a. Discuss and explain elements related to demand forecasting.
   b. Read, comprehend, and apply aggregate planning.
   c. Explore managing predictable variability.
4. Identify planning and managing inventory systems.
   a. Discuss cycle inventory and safety inventory.
   b. Read, comprehend, and apply determining product availability.
5. Explore designing and planning transportation networks.
   a. Discuss transportation designs and networks.
   b. Explore cross functional drivers.

Course Number and Name: **MTA 1473** **Logistics Management**

Description: This course is designed to help the student solve actual challenges they will encounter in the marketplace. Basic decision-making tools and concepts will be used for finding cost reduction and strategic opportunities.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Introduce the supply chain management concept.
   a. Describe and discuss the supply chain management concept.
   b. Discuss business logistics.
   c. Explain the role of the customer in supply chain management.
   d. Explain supply side of logistics.
   e. Describe and discuss global logistics.
2. Describe and discuss inventory, warehousing, and transportation.
   a. Examine inventory as a critical activity.
   b. Discuss warehousing.
   c. Examine the transportation process.
3. Examine strategic issues related to logistics.
   a. Examine third-party logistics services.
   b. Examine supply chain information systems.
   c. Describe logistics performance measurements and metrics.

Course Number and Name: **MTA 1483** **Principles of Maritime Marketing**

Description: Study of principles and problems of marketing in the maritime industry and a review of maritime methods of distribution from producer to consumer. Topics include types, functions, and practices of maritime business and efficient techniques in the development and expansion of markets.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Explore each facet of the maritime marketing mix and marketing strategies.
   a. Explain the definition of marketing and its' place in the free-enterprise system.
   b. Identify and analyze the external and internal influences that affect maritime marketing decisions.
   c. Identify and describe each element of the maritime marketing mix: price, product, place, and promotion.
   d. Identify maritime marketing strategies used for the shipbuilding industry.
   e. Analyze appropriate maritime target markets.
   f. Identify classifications of maritime goods within the appropriate stage of the product life cycle.
   g. Determine appropriate criteria and stages in the development of new maritime products.
   h. Explain concepts of maritime marketing research.

Course Number and Name: **MTA 1493** **Maritime Employee Management**

Description: The study of the objectives, organizational structure, and functions of maritime employee management. Emphasis is placed on job evaluation, training, education, safety, health, supervisor-employee relationships, and available maritime employee services.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Identify the information relative to the placement, training, and development of employees in the maritime industry.
   a. Discuss government regulations that impact maritime employees.
   b. Demonstrate various motivational methods for improving the performance of maritime employees.
   c. Demonstrate the roles supervisors play in employee relations.
   d. Explain wage and salary, fringe benefits, and other compensation incentives.
   e. Discuss appraisal and performance review.
   f. Discuss policy, practice, and procedure manuals.
   g. Discuss and analyze crisis management.

Course Number and Name: **MTA 1613 Shipbuilder Exploration**

Description: Shipbuilder Exploration is a multi-craft class that introduces students to the shipbuilding industry. Each craft will teach basic safety responsibilities, career opportunities and expectations involved in obtaining an employment. Students will have the opportunity to earn NCCER credentials for each module and performance task that is successfully completed.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Shipbuilder Exploration is a multi-craft class that introduces students to the shipbuilding industry. Each craft will teach basic safety responsibilities, career opportunities and expectations involved in obtaining an employment. Students will have the opportunity to earn NCCER credentials for each module and performance task that is successfully completed.
2. Sheetmetal Objectives: (04102-08) (04103-08)
   a. Identify and describe the proper use of tools commonly used in the Sheetmetal trade.
   b. Describe poor maintenance producers for tools, safety, and usage of tools for Sheetmetal.
   c. Layout terms, marking tools, forming tools for the Sheetmetal craft.
   d. Identify and explain the three development methods for laying out Sheetmetal patterns.
   e. Demonstrate how to select and use forming tools, hand snips, hacksaws and squaring shears for cutting out parts and patterns.
   f. Demonstrate how to construct seams, edges, and duct connectors.
3. Industrial Coating Objectives (69102-09) (69103-09)
   a. Define the com composition and purpose of different industrial coating.
   b. Discuss the cause of premature failure coating.
   c. Define and list the components of process control.
   d. Define quality control and quality assurance.
   e. State the purpose of preparing test sections for demonstration process.
   f. Explain some of the preparation and application methods and how some coating are used.
   g. State the purpose of teaching coating component.
   h. List the physical properties of paint and coating additives.
   i. State the purpose for solvents (thinners) in cleaning.
   j. State the difference between convertible and non-convertible coating.
   k. List curing mechanisms for coating.
   l. Identify conditions that must be considered before selecting a coating/lining.
   m. Describe coverage of coating and learn to calculate wet-dry film thickness.
   n. Locate and practice safety procedures listed on the material safety data sheet (MSDS).
   o. Describe disposal techniques for hazardous and non-hazardous waste.
4. Insulation Objectives: (19101)
   a. Explain what insulation is and the basic used of insulation.
   b. Understand the history of insulation.
   c. Identify tools, material and systems and their uses.
   d. Explain what an estimate is used for in a project.
   e. Explain the difference between commercial and industrial plants.
   f. Explain what energy conservation is.

g. Explain who subcontractors, general contractors and owner are.

5. Electrical Objectives: (26101-14) (26103-14) (26106-14)
   a. Define the various sectors of electrical industry.
   b. Define voltage and the ways in which it can be produced.
   c. Explain the differences between conductors and insulators.
   d. Define the units of measurement in voltage, current and resistance.
   e. Explain the basic characteristics of series and parallel circuits.
   f. Describe the differences between a nonmetallic and metallic boxes.
   g. Calculate the NEC fill requirement for boxes under 100 cubic inches.
   h. Identify the appropriate box type and size for a given application.
   i. Select and demonstrate the appropriate method for mounting a given box.

6. Support Craft Objectives: (84101-13) (85106-13) (86104-14) (15101-06) (15101-06) (85101-13) (85206-13)

   a. Recognize and identify structural members and calculate their thickness.
   b. Identify layout tools, fitting tools, and fitting aids used to fit up, align, and check plate joints.
   c. Demonstrate various precision tools of the millwright trade.
   d. Identify the different types of ladders and scaffolding used on a work site, and how to safety use them.
   e. Describe how to safely use ladders and scaffolding.
   f. Identify the types, sizes and assembly methods for fiberglass pipe and fittings (plastic).

*NCCER module numbers are in parenthesis

Course Number and Name: **MTA 1623** **Metal Lagging**

Description: This course is designed to provide the Apprentice with the fundamentals of layout, cutting, forming, and fabrication of sheet metal.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Demonstrate safety in the sheet metal shop using hand and shop tools.
2. Layout and fabrication of basic pipe metal lagging patterns on layout paper.
3. After layout and fabrication of basic pipe patterns, transfer those layouts to metal and use the sheet metal shops equipment to shape the sheets of metal to fit properly around the pipe mock up

Proper installation of the metal around the piping systems.

Course Number and Name: **MTA 1633** **Project Management**

Description: This course is designed to provide the Apprentice with the foundation skills needed to understand roles and responsibilities of construction, supervision and managing projects.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Define the roles and responsibilities of project management and basic supervision.
2. Identify the importance of safety in the workplace, cost of safety, and the roles and responsibilities of a project manager.
3. Describe the value of good communication skills and relationship building between management, crew members, and stake owners.
4. Describe successful negotiation techniques and problem solving techniques.
5. Explain the importance of filling out company documents correctly, where to obtain the documents.
6. Discuss techniques on planning the job out daily, weekly, and the life cycle of the project.
7. Describe the importance of accurate estimating and budget control of the project being worked.
8. Explain how projects are scheduled and the importance of scheduling projects.
9. Identify the resources that must be controlled and the proper process for controlling material and equipment.
10. Describe quality control, quality assurance, and the importance of quality.
11. Describe the project manager's role in creating a culture of continuous improvement.

Course Number and Name: **MTA 1643** **Production Planning and Control**

Description: This course provides managerial information regarding material requirements, capacity planning and control techniques, master production scheduling, and techniques in cost analysis.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:
Refer to the current curriculum for updated Student Learning Outcomes.

1. Introduction to planning and controlling.
   a. Examine historical issues in planning and controlling
   b. Explore the evolution of the scientific method regarding planning and controlling.
   c. Identify production and planning procedures.
2. Discuss production systems.
   a. Identify the different production systems.
   b. Compare and contrast the production system.
3. Explore the element of planning and controlling
   a. Discuss the functions of planning and controlling
   b. Illustrate how planning and controlling models are useful in making decisions.
   c. Identify results and consequences of making decisions based on these models.
4. Review techniques for production planning.
   a. Discuss Gantt charts, network models, product tree structures, and bills of materials.
   b. Apply team approach strategies to application models.
   c. Draw flowcharts for production planning.
5. Discuss medium term production planning.
   a. Identify demand management practice with regards to forecasting.
   b. Determine short, medium, and long term capacity planning.
   c. Develop master production schedules and strategies.

Course Number and Name: **MTA 1654** **Inspection Fundamentals**

Description: Inspection Fundamentals provides an introduction to coating specific structures, inspection of coating operations, government regulations affecting the coating industry, programmed painting, quality control for protective coatings projects, and coating failures. It allows for apprentices to develop knowledge and skill to reinforce attitudes and behaviors for preparing surfaces and applying coatings to specific structures, standard industry inspection methods used in coatings operations, government regulations that impact the coatings industry, aspects of designed programmed painting systems to provide for structural protection, quality control methods for good coating performance and those coating failures that may occur when quality control is lacking.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Describe factors involved in worker safety and hazards associated with the coating industry.
2. Describe methods for prevention and control of corrosion.
3. Discuss the importance of surface preparation in achieving the maximum level of coating protection available.
4. Describe inspection methods and equipment used in coating operations.
5. Summarize government regulations impacting the coating industry.
6. Describe the elements of a total protective and maintenance coatings program.
7. Identify quality control methods necessary for good coating performance and types of coating failures as a result of poor quality.

Course Number and Name: **MTA 1663 Surface Preparation**

Description: Instructional methods include lecture, assessment exercises, and possible mock-up style exercises (field-trip/labs/hands-on) for performance checks. Surface Preparation provides an overview of steel surface preparation, hand and power tool cleaning, nonmetallic abrasives, metallic abrasives, abrasive air blast cleaning, centrifugal blast cleaning, wet abrasive blast and pressurized water cleaning (Water jetting), the effects of soluble salts on protective coatings, other methods of surface preparation, solvent and pre-cleaning, dehumidification during coating operations. It also discusses surface preparation of nonferrous and other surfaces.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Explain the importance of the Society for Protective Coatings (SSPC) standards and regulations
2. Describe and identify various surfaces and substrates
   a. Outline various preparation methods used on various surfaces
   b. Describe general preparation procedures for various types of surface/substrates
3. Describe preparation agents and washing/cleaning (SSPC-SP1)
4. Describe low pressure water washing and safety guidelines
   a. Describe factors involved in worker safety and hazards associated with the coating industry
   b. Demonstrate low pressure water washing
5. Describe and identify hand and power tools for surface preparation
   a. Describe factors involved in worker safety and hazards associated with the coating industry
   b. Summarize the general procedures for specific surfaces and substrates
   c. Demonstrate and identify various hand and power tools and SSPC standards associated with the tool
6. Summarize concrete surface preparation
   a. Explain repair/replacement
7. Outline functions and types of components used for basic abrasive blast system equipment
   a. Describe compressor equipment
8. Outline types of blast machines
   a. Describe various blast equipment and characteristics
   b. Outline various abrasive materials
   c. Describe factors involved in worker safety and hazards associated with the coating industry
9. Outline loading/recovery equipment and characteristics of blast media
   a. Describe preparation standards, profiling, and inspection techniques
   b. Describe blast surface profiling/measurement and environmental impact

Course Number and Name: **MTA 1673** **Spray Painting**

Description: Spray Painting provides an introduction of the use of coating systems for the protection of steel surfaces, how coating concrete surfaces differs from coating steel, describes powder coating materials, application methods, substrates, and curing techniques. It continues with how metalizing is used to protect steel from corrosion and describes sealing and top coating to provide optimum corrosion protection. It covers all coating application methods and advantage and limitations of each. It covers the types of equipment typically used for successful maintenance painting and finishes off with the different types of industrial and light industrial/commercial paint shops, their methods of operations, and their advantages and limitations when compared to on-site field painting

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Describe factors involved in worker safety and hazards associated with the coating industry.
2. Summarize initial preparation, paint brush and roller equipment, advantages and disadvantages.
3. Identify and demonstrate coating application methods and the advantages and limitations of Conventional and Airless technology.
4. Summarize High-Pressure, Low Volume (HLVP) and Plural Component System processes, coating materials, safety hazards, and guidelines.
5. Summarize Thermal spray processes, coating materials, safety hazards, and guidelines.
6. Describe the equipment, application methods and curing techniques of powder-coating.

Course Number and Name: **MTA 1684 Introduction to Insulation**

Description: This course provides the fundamentals of layout, cutting, forming, and fabrication of insulation used on various types of piping systems, ventilation systems, and the hull of the marine vessel.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Explain duties, responsibilities and various jobs within the marine insulation industry.
2. Identify and demonstrate the safe use of hand tools and proper use in fabrication of insulation.
3. Differentiate among types of insulation used in marine insulation.
4. Demonstrate how to install basic hull board, ventilation and pipe insulation.
5. Learn to recognize different systems and their insulation requirements.
6. Apply advanced patterns and standard layouts used to correctly layout and cut insulation material for piping, ventilation systems and ship's hull.
7. Solve basic rule reading problems applicable to the insulation craft.
8. Demonstrate proper use of insulation pin layout and personal protection equipment during construction.
9. Describe ship and command media process and procedures applicable to the insulation craft.
10. Participate in hands on pipe, ventilation and hull mock-up activities**.**

Course Number and Name: **MTA 1693** **Blueprint Reading for Sheet Metal**

Description: This course is an introduction to the fundamentals of blueprints, reading, interpreting, and understanding blueprints. The students will develop an understanding of the different types, sizes, and parts of various drawings as they relate to the sheet metal craft

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

8. Explain duties of various symbols and lines
9. Demonstrate the use of symbols and lines
10. List and identify the major components of a blueprint
    a. Abbreviations and Symbols
    b. Basic Lines
    c. Orthographic Principles, View Relations, Visualization
    d. Notes, Specification
    e. Revision
    f. Index
    g. Key plan
    h. References
    i. Dimensions
    j. Title Block
    k. Sheet Zone
    l. Port, Starboard, Forward, Aft, Center Line
    m. Ship relations to Longitudinal, Frames, Deck Levels
    a) Describe the difference between drawings
    b) Standard vs metric
    c) Sheet numbering
11. Differentiate the drawing views
12. Navigate the drawings revisions

Reading and understanding drawings

Course Number and Name: **MTA 2274** **Marine Pipefitting**

Description: Instructional methods include lecture, assessment exercises, and possible lab(s) for performance checks. Marine Pipefitting will provide an introduction to pipe & related materials, types of pipe & pipe fittings, pipe fabrication angle calculations, fundamentals of fabrication, advanced pipe fabrication, in-line specialties, and special piping.

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Describe the types of metal, manufacturing process, and standards used for pipe and related materials.
2. Identify the purpose, function and application of pipe and pipe fittings.
3. Given proper dimensions, materials, and equipment, demonstrate the steps used to determine the angle calculations that are required to fabricate a piping run.
4. Describe the fundamental practices used to fabricate piping for shipbuilding.
5. Given proper dimensions, materials, and equipment, demonstrate the steps used to calculate, layout, and fabricate advanced piping runs.
6. Identify the potential hazards, purpose and use of in-line specialties.
7. Given a list of materials and equipment, discuss the steps used to install special piping.

Course Number and Name: **PPT 1513** **Safety, Health & Environment**

Description: This course is designed to provide a development of knowledge and skills to reinforce attitudes and behaviors required for safe and environmentally sound work habits. Emphasis is placed on Safety Health and Environment al issues in the performance of all job tasks and regulatory compliance issues

Hour Breakdown:

Semester Credit	Lecture	Lab	Clock
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes

1. Describe various types of physical hazards commonly found in process industries.
2. Describe the chemical hazards in process industries.
3. Describe the biological, ergonomic and plant specific hazards associated with various processes.
4. Describe the environmental hazards in process industries.
5. Identify the various Engineering controls used to make process areas safe.
6. Discuss the various Administrative controls – Programs and Practices.
7. Describe the importance and application of PPE in process industries.
8. Describe the important role OSHA plays in the process industries.
9. Describe the important role EPA (state and federal) plays in process industries.
10. Describe the other regulatory agencies that impact the Process Industry.
11. Discuss general rules for working in confined spaces and dangerous atmospheres.
12. Describe the process for preparing and performing hot work.
13. Summarize the purpose and safety measures for the lockout/tags plus process.
14. Explain the purpose of the incident response team and the elements on the first aid checklist.

APPENDIX A: RECOMMENDED TOOLS AND EQUIPMENT

Capitalized Items

1. Miller live Arc Simulator
2. Miller pack 4 welding machine
3. Marvel series 8 mark II saw
4. 5' Hydraulic Shear
5. 6' Sheetmetal handbrake
6. 4' Sheetmetal Box and Pan Brake
7. LabVolt Trainers
8. Industrial Control Trainers
9. Kitco ST Install Kit
10. AFL Noyes OTDR
11. Corning Splice Kit
12. Miller NT 456 cc/cv

Non-Capitalized Items

1. Hypertherm powermax 30 air
2. Vert. Mill Machine/Stand
3. 9 inch Lathe/stand
4. ½ Drill Press-Bench Top
5. 5/8 Drill Press-Gear driven
6. ½ Drill Press-floor mount
7. Vert. Band saw
8. 5 ½" Bench vise
9. DAC Coupling Align Trainer
10. 52" Stomp Shear
11. Benchthroat Shear
12. Vertical Band Saw
13. Welding Machine (Protable)
14. Stake Bench Plate
15. State Bench Plate Stand
16. Common Square Stake
17. Hatchet Stake
18. Beakhorn Stake
19. Blowhorn Stake
20. Double Seaming Stake (with 4 heads)
21. Electronic Pad Trainer
22. Fluke 287 Digital Multimeter
23. Fluke 123 Scopemeter
24. PLC Trainers
25. Fluke 177 DMM
26. Fluke 287 DMM
27. Extech DMM
28. Triplett Volt Ohm Meter
29. GW Intek Function Generator
30. BK Function Generator
31. BK 40 Mz Oscope
32. BK 30 Mz Oscope
33. Miller Brand 8VS Suitecase

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

APPENDIX B: CURRICULUM DEFINITIONS AND TERMS

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

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

- Classification – Courses may be classified as the following:
    - 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)

APPENDIX C: RECOMMENDED TEXTBOOK LIST

Recommended Commercial Truck Driving Text Book List CIP: 46.9999-Maritime						
Course Name	**Book Title/Guide Title**	**ISBN Number**	**Author (s)**	**Edition**	**Copyrigh t Date**	**Handout (In-House Printing)**
AC Circuits	Grob's Basic Electronics	978-0-07-351085-9	Mitchel E. Shultz	11th	2011	AC Circuits Lab Manual
Carpenter Shop I *	SG					N/A
Carpenter Shop I *	Introductory Technical Mathematics	978-1-111-54200-9	Smith, Peterson	6th	2013	N/A
DC Circuits	Grob's Basic Electronics	978-0-07-351085-9	Mitchel E. Shultz	11th	2011	DC Circuits Lab Manual
DDT 2664 Marine Systems Integration (Marine Engineering)	Introduction to Marine Engineering	0 7506 2530 9	D.A. Taylor	2nd	1996	N/A
Digital Electronics	Digital Electronics Principles & Applications	978-0-07-337377-5	Roger Tokheim	8th	2014	Digital Electronics Handout Book
Electronic Communications	Principles of Electronic Communication Systems	978-007-337-385-0	Louis E. Frenzel Jr.	4th	2016	N/A
Fundamentals of Drafting	Technical Drawing with Engineering Graphics	13: 978-0-13-509049-7	Frederick E. Giesecke…[et al.].	14th		N/A
Fundamentals of Fiber Optics	FOA Reference Guide To Fiber Optics and Study Guide to FOA Certification	1-4392-5387-0	Jim Hayes	NA	2014	N/A
Inspection Fundamentals	Industrial Painting	ISBN-10: 0-13-910100-4	National Center for Construction Education and Research	Ist	1998	N/A
Introduction to Blueprint Reading	Introduction to Blueprint Reading	N/A	HII	Rev 1.0	1979	N/A
Introduction to Shipbuilding and Blueprint Reading	SG	N/A	HII	3	2018	Introduction to Shipbuilding and Blueprint Reading

						Visualization Orthographic Projection
Introduction to Shipbuilding and Blueprint Reading	Ship Construction	978-0-08-097239-8	Elsevier Ltd.	7th	2012	N/A
Introduction to Shipbuilding and Blueprint Reading	Introduction to Blueprint Reading	N/A	HII	Rev 2.0	2015	N/A
Journeyman Essentials for HA Welders	Welding - Level 1 (Module 1) and Welding - Level 2 (modules 1-2, 4-6)	10: 0-13-609967-X 10: 0-13-609970-X	NCCER - Pearson Education Inc.	1st	Level 1 - 2010, Level 2 - 2014	N/A
Journeyman Essentials for RA Welders	SSG M5350; Welding and Workmanship Requirements for Naval Surface Ship Hull Construction Pages 1-33	NA	HII	N/A		N/A
Journeyman Essentials for Shipfitters	Maritime Structural Fitter - Level 2, 1st Ed.	10: 0-13-383066-7	NCCER - Pearson Education Inc.		2014	N/A
Marine Pipefitting	Marine Pipefitting	N/A	HII	Rev 2.0	2015	
Marine Pipefitting	MFPI-82052 Marine Pipefitting	10: 1-269-83743-5	Pearson Education Inc.		2015	Marine Pipefitting Symbol Handout
Marine Pipefitting	Introduction to Marine Pipefitting		HII	N/A	N/A	
Mechanical Maintenance IV	Industrial Mechanics and Maintenance	13: 978-0-13-515096-2	Larry Chastain	3rd	2009	N/A
Occupational Math	Introductory Technical Mathematics	978-1-111-54200-9	Smith, Peterson	6th	2013	N/A
Naval Architecture	Ship Construction	978-0-08-097239-8	Elsevier Ltd.	7th	2012	Naval Architecture and Ship Structures Handout
Occupational Math	Introductory Technical Mathematics	978-1-111-54200-9	Smith, Peterson	6th	2013	N/A
Pipe Weld Shop	Pipe Weld Shop August 2015	10: 1-269-83743-5	Pearson Education Inc.	1st	2015	N/A

Pipefitter New Hire Program Student Guide						N/A
Pipfitter RA New Hire Program	SG	N/A		Rev 1.0		N/A
Pipefitter RA Blueprint Reading	Pipe Drafting and Design	978-0123847003	Parisher, R. & Rhea, R.	3rd	2012	Pipefitter RA Blueprint Reading Handouts
Power Machinery	Machine Tool Practices,	13: 978-0-13-501509-4	Richard R. Kibbe; Roland O. Meyer; John E. Neely; Warren T. White	9th	2010	N/A
Precision Layout	Machine Tool Practices,	13: 978-0-13-501509-4	Richard R. Kibbe; Roland O. Meyer; John E. Neely; Warren T. White	9th	2010	Precision Layout Handout
Principles of Management	Management	978-0-13-304360-0	Robbins, Coulter	12th	2014	N/A
Production Planning and Control	Production and Operations Management Systems	9781466507333	Sushil Gupta and Martin Starr		2014	N/A
Programmable Logic Controllers	Programmable Logic Controllers	978-0-07-337384-3	Frank D. Petruzella	5th	2017	Programmable Logic Controllers Lab Manual
Revision of Inverted Unit Training Mock-up - Pipe	N/A	N/A	N/A	N/A	N/A	N/A
Rigger Shop I	Signal Person Basic Rigger	978-0-13-215454-3 978-0-13-215456-7	NCCER NCCER	1st	2011 2011	N/A
Rigger Shop II	Intermediate Rigger	978-0-13-215458-1	NCCER	1st	2011	N/A
Rigger Shop II	Blueprint Reading for Riggers		Washington	1st	2015	N/A
Safety, Health, & Environment	Safety Health and Environment	978-0-13700401	Center for Advancement of Process Technology (CAPT)	1st	2010	Safety Health and Environment Handouts
Sheetmetal Layout I	Sheet Metal	978-08269-1910-6	Leo A. Meyer	2nd	2006	N/A
Sheetmetal Layout II	Sheet Metal	978-08269-1910-6	Leo A. Meyer	2nd	2006	Layout II Handouts

Sheetmetal Layout III	Sheet Metal	978-08269-1910-6	Leo A. Meyer	2nd	2006	N/A
Solid State Devices and Circuits	Electronic Principles	978-0-07-297527-7	Albert Malvino David J. Bates	7th	2007	Solid State Devices and Circuits Lab Manual
Solid State Motor Controls	Electrical Motor Controls for Integrated Systems	978-0-8269-1226-8	Gary J. Rockis Glen A. Mazur	5th	2014	Solid State Motor control
Spray Painting	Industrial Painting	10: 0-13-910100-4	National Center for Construction Education and Research	Ist	1998	Plural Component Lab, Airless Spray System Lab, Conventional Spray System Lab
Surface Preparation	Industrial Painting	10: 0-13-910100-4	National Center for Construction Education and Research	Ist	1998	Lab Abrasive Cleaning Blasting, Lab Low Pressure Water Cleaning, Power, Lab Hand/Power Tool Cleaning
Tri Tool Pipe End Prepping Class			Hendrickson		Comp. 2014	N/A
Welding Theory & Technique	Welding Principles and Applications	10: 1-1110-3917-8	Larry Jeffus, Delmar Cengage Learning	7th	2012	Weld Theory and Techniques Handouts