THE APPRENTICE SCHOOL COURSE CATALOG

For apprentices that began their apprenticeship PRIOR to July 27, 2020 refer to pages 2-11

For apprentices that began their apprentice ON OR AFTER July 27, 2020 refer to pages 12-31

World Class Shipbuilder Curriculum (WCSC)

A100 Apprentice Success Skills
18 Hours 1 Credit

Assists students in having a successful transition to the academic and craft demands of an apprenticeship. Academic related topics include: Skip Downing's student success strategies, academic policies, plagiarism prevention, algebra review, goal setting, study skills, and test-taking strategies. Craft related topics include: career and academic planning, safety orientation (personal protection equipment, confined spaces, and plant security). Topics are reinforced through real-life examples, discussion, and team-based approaches. Provides opportunity for apprentices to meet with student services, athletics, craft, and academic staff. Includes the math placement test. Required of all apprentices. Pass or fail.

B112 Problem Solving
42.75 Hours 4 Credits

Includes methods and tools for problem solving and decision making in industrial environments. Topics include: team concepts, systems analysis, identifying and documenting objectives, functional flow diagrams, timeline analysis, and statistical process modeling. Topics are reinforced through a team-based term project focusing on process improvement. Special emphasis is given to leadership principles and behaviors.

B122 Business Operations and Leadership
42.75 Hours 3 Credits

Introduces business and leadership concepts with specific application to the shipbuilding industry and leadership principles of Newport News Shipbuilding. Includes topics such as, product mix, business strategies, contracts, process improvement, quality programs, shipbuilding economics, teams and teamwork, communications, the principles of leadership and corporate values.

C111 Technical Communications I
52.25 Hours 3 Credits

Prepares apprentices to meet written and oral demands of a business environment. Includes instruction in writing and speaking skills, with application to business communications such as, written reports and procedures, memorandums, and oral presentations. Microsoft Office applications are utilized for writing, editing, and preparation of presentation materials

C211 Introduction to Computers
42.75 Hours 3 Credits

Provides students with the skills and knowledge related to computer use at Newport News Shipbuilding, which will support computer requirements in subsequent academic courses and prepare apprentices for tasks requiring computer usage after their apprenticeship. Includes an overview of hardware, software, operating systems, workstations, microcomputer processes, and NNS policies. Emphasizes the Microsoft Office Suite including Word, Excel, Access, PowerPoint, Outlook, Explorer, and Windows.

D111 Drafting
57 Hours 3 Credits

Exposes apprentices to the fundamentals and principles of engineering drafting as it relates to the shipbuilding industry. Skills taught include freehand sketching, and both 2D and 3D AutoCAD applications for orthographic projection, auxiliary and sectional views, isometric drawings, and solid modeling.

M010 Math Review
31.5 Hours, 0 Credits

A non-credit course that focuses on the math skills an apprentice will need to be successful in the WCSC. Topics include order of operations, laws of exponents, linear equations, and formulas, problem solving with unit conversions, polynomial operations including factoring, and reducing algebraic fractions by factoring. Apprentice School Developmental long-term math review course designed to prepare individual apprentices that require extra assistance for M111, Technical Mathematics I, in the World Class Shipbuilder Curriculum. Review of basic algebra skills to include signed numbers, order of operations, laws of exponents, and polynomial operations.

M111 Technical Math I
57 Hours 3 Credits

Supports the craft training programs. It provides apprentices with the basic skills necessary to be successful in the mathematics, science, and engineering courses of their academic curriculum and prepares apprentices for future educational opportunities. It includes linear equations, factoring, algebraic fractions, exponents, roots, radicals, quadratic equations, graphing, systems of equations, and application-related principles/problems.

M112 Technical Math II
57 Hours 3 Credits

Uses algebraic principles to solve shipbuilding applications of plane and solid geometry, right and oblique triangle trigonometry, and vector principles. Includes principles/problems from plane and solid geometry and trigonometry, Pythagorean Theorem, surface area and volume of various figures, trigonometric functions and solution of right triangles, oblique triangles using the Laws of Sines and Cosines, and vectors and equilibrium solutions of concurrent force systems.

M121 Mechanics
52.25 Hours 3 Credits

Mechanics builds the bridge between the analytical world of mathematics, science, and engineering and the practical world of shipbuilding design and construction. Includes application of free-body-diagrams (FBDs) to various force systems and the subsequent application of the equations of static equilibrium in finding the external support reactions of the FBDs. The reactions are used in strength of materials problems to determine the required dimensions of the various pieces of material.

N111 Ship Construction I
38 Hours 2 Credits

Introduces shipbuilding by providing a common vocabulary of shipbuilding terms, the basic elements of a ship, the concept of a process, the shipbuilding trades, and the company's quality program. Includes specific topics such as: the definition of a ship, ship's mission requirements, ship's hull design, drawings, lines and offsets, ship components of hull structure, the modern shipbuilding process and facilities, the fundamental force support systems, and the concepts of quality and process excellence used at NNS.

N222 Ship Construction II
38 Hours 3 Credits

Provides apprentices with an understanding of the typical propulsion plants and their associated components used in today's Navy. Includes the operation and major components of a ship's basic propulsion drive train including: resistances, a conventional steam cycle propulsion system, a pressurized water reactor propulsion system, a gas turbine propulsion system and a basic internal combustion propulsion system. Included are the scientific laws and principles involved.

P221 Physical Science I
57 Hours 3 Credits

Introductory physics course that integrates scientific theories with waterfront experiences. Topics include forces, velocity, acceleration, energy, work, power, and momentum (both translational and rotational modes), freely falling bodies, projectile motion, friction, centrifugal and centripetal forces.

P222 Physical Science II
57 Hours 4 Credits

Physical Science II is a continuation of physics introduced in Physical Science I. Topics include simple machines, the principles of fluids at rest and in motion. Emphasis is placed upon density, specific gravity, pressure, Pascal's law, Archimedes' principle, and Bernoulli's principle. The relationships between temperature change and the effect on the physical dimensions on material and the relationship among the various temperature scales is studied. Topics also include the quantity of heat, calorimetry, and latent heat.

S101 SafeStart
30 Hours 2 Credits

Employs the broad category of safety awareness and personal safety skills development. It focuses on the human factors that are involved in the majority of incidents and injuries. States like rushing, frustration, fatigue, and complacency lead to unintentional, risk-increasing errors like eyes and mind not on task, being in or moving into the line-of-fire or losing your balance, traction or grip.

Trade Related Education Curriculum (TREC)

COATINGS SPECIALIST

X331 Paint and Surface Preparation
40 Hours 2 Credits
Provides the apprentice with an understanding of safety, surface preparation, and typical paint installation techniques for new ship construction and overhaul. Describes the function and use of hand and mechanically operated trade tools used for surface coating calculation, preparation, application, and final surface presentation. Creating and maintaining safe work habits and conditions are stressed throughout the course.

X332 Blueprint Reading for Painters
10 Hours 1 Credit
Instructs the apprentice in reading, interpreting, and applying painting information from blueprints and other construction documents to new ship construction and overhaul. Includes the principles necessary to interpret and apply information from various types of blueprints, schedules, data sheets, charts, procedures, and other job related documents. Includes compartment and access plans, deck and wall coverings, painting schedules, inspection procedures, other trade documents and forms.

DIMENSIONAL CONTROL TECHNICIAN

O681 Industrial Measurement–Instrumentation Theory I
80 Hours 3 Credits
This course covers tasks associated with performing on-site visual inspections of components to determine measurement methodology, planning and coordinating phases of the measurement survey process and analyzing/interpreting data. This is an introduction and orientation to industrial measurements in a large manufacturing and industrial setting. This course will take a hands-on approach in which majority of the time will be spent using Metrology equipment and applicable software including Spatial Analyzer, V-Stars, and Excel. Specific Metrology equipment includes care and handling, compensation, and utilization of the Total Station, Laser Tracker, Photogrammetry, Coordinate Measurement Machines and Precision Measurement Instruments.

O682 Industrial Measurement–Trades Processing Theory II
80 Hours 3 Credits
An overview of the trades that O68 provides data and how they will use the information. This course will take a hands-on approach to identify the trades build sequence and the requirement that must be achieved including tolerances and job specific activities. Trades modules will have files within SA to process using the transformation techniques used for majority of the job classifications.

ELECTRICIAN

X311 Applied Theory I: DC Concepts
90 Hours 5 Credits
Introduction to DC theory is a prerequisite for subsequent electrical theory classes as well as, a provider of essential information on electrical safety. This course introduces the effects of DC voltage, current and power in resistive circuits (including series, parallel, and series-parallel networks with emphasis on Kirchhoff's voltage and current laws), and voltage divider and current divider rules. Circuit analysis includes source conversion, mesh analysis, superposition, and Thevenin's and Norton's theorems. Practical lab exercises incorporate standard test equipment, classroom theory, troubleshooting skills, and electrical safety.

X312 Applied Theory II: AC Concepts
90 Hours 5 Credits
This course completes DC concepts by presenting transient effects of capacitors and inductors and discussing magnetic circuits. AC theory concepts and applications are introduced using general sinusoidal format for AC voltage, current, power and frequency as it applies to resistive and reactive series, parallel and series-parallel networks. Circuit analysis includes mesh analysis, superposition, and Thevenin's and Norton's theorems. Practical lab exercises incorporate standard test equipment, classroom theory, troubleshooting skills, and electrical safety. Prerequisite: X311

X313 Applied Theory III: Polyphase Systems and Controls
115 Hours 6 Credits
This course continues AC theory concepts including resonance, filters, AC power, polyphase systems and transformers. Information on motor controls begins with the principles and applications of DC and AC generators and motors and continues with examples of DC and AC electromechanical controls including schematic symbols, wiring and schematic diagrams, relays and contactors, motor overload devices, time delay circuitry, reduced voltage starting methods, and deceleration methods. The student learns the most effective methods and strategies used to troubleshoot complex electromechanical control systems through hands on laboratory exercises emphasizing electrical safety, electromechanical circuit design and troubleshooting. Prerequisites: X311 and X312

X316 Programmable Logic Controllers
66 Hours 2 Credits
The course begins with an introduction to digital electronics including numbering systems, gate logic and combinational logic, and continues with applications of digital electronics through encoders, decoders, flip-flops and counters. The course continues with programming, hook-up and troubleshooting of programmable logic controllers (PLCs). Industry standard PLCs and programming software are used for specific training on ladder logic diagrams, input/output instructions, internal relays, timers, counters, compare and math functions, control instructions, sequencers, retrofitting, and program design. Prerequisite: X313

HEATING & AIR CONDITIONING WORKER

All Electrical Theory Courses (See ELECTRICIAN)

043H Air Conditioning and Refrigeration I
90 Hours 4 Credits
Studies refrigeration theory, characteristics of refrigerants, temperature, and pressure, tools and equipment, soldering, brazing, refrigeration systems, system components, compressors, evaporators, and metering devices. Presents charging and evaluation of systems and leak detection. Explores servicing the basic system. Explains use and care of oils and additives and troubleshooting of small commercial systems.

HEAVY METAL FABRICATOR

X111 Hull Construction Theory I (See SHIPFITTER)

X151 Fundamentals of Fabrication
16 Hours 1 credit
Develops an understanding of efficient heavy metal fabrication machinery, processes, and procedure.

INSULATOR

X333 Theory of Insulation
40 Hours 2 Credits
Provides apprentice with an understanding of safety, application and installation of insulation materials for new ship construction and overhaul. Describes the function and use of hand and mechanically operated trade tools used on various insulation compositions, application and installation, and safe work practices while working with hazardous materials.

X334 Blueprint Reading for Insulators
11 Hours 1 credit
Instructs the apprentice in reading, interpreting, and applying insulation information from blueprints and other construction document to new ship construction and overhaul. Includes the principles necessary to interpret and apply information from various types of blueprints, schedules, data sheets, charts, procedures, and other job related documents.

MACHINIST

M531 Machinist Shop Theory
30 Hours 2 Credits
This course is designed to cover basic machine shop safety, hand tools, measuring tools (including precision measuring tools), metric measurement, tapers and angles, and basic machine theory. Included are tools and attachments for machines such as the drill press, shaper, slotter, planer, milling machine, and engine lathe. Identification of machines and their principal parts and machine operation are also covered. Apprentices will be introduced to drawings and cover basic shop work practices. Proficiency evaluations include tests.

M533 Computer Numerical Control Programming/Lab
80 Hours 3 Credits
Introduces the concepts of Computer Numerical Controlled (CNC) programming. Apprentices will write detailed programs using "G" code and "M" code as they learn various machining operations. These operations include using fixed cycles and subroutines, linear and circular interpolation, tool radius compensation as well as modern touch-off approaches using electronic probing. This course includes an operator section to teach each student responsibilities of the programmer and the specifics within the machine. This class is the second trade related theory course that all machine shop apprentices are required to complete. This course provides knowledge of CNC programming which would allow the apprentice to read and analyze a numerically controlled program in order to run their first CNC machine successfully. Prerequisite: M531

MAINTENANCE ELECTRICIAN

****All Electrical Theory Courses (See ELECTRICIAN)***

MAINTENANCE PIPEFITTER

****X421 Introduction to Pipefitting (See PIPEFITTER)***
****X422 Blueprint Reading Fundamentals and Procedures (See PIPEFITTER)***

MILLWRIGHT

***M531 Machinist Shop Theory* (See MACHINIST)**

0431 Introduction to Hydraulics
30 Hours 3 Credits
Provides an understanding of hydraulic systems, associated components, and their schematics found in the shipyard. Covers introductory hydraulics including air and fluid power principles, hydraulic power system components, different types of hydraulic fluids, hydraulic strainers and filters, hydraulic reservoirs and accumulators, hydraulic piping, tubing and fittings, hydraulic directional control valves, hydraulic pressure control valves, hydraulic cylinders, hydraulic motors, and rotary activators.

MODELING AND SIMULATION

EGR 218 Introduction to Modeling and Simulation
45 Hours 3 Credits
Introduces basic concepts in modeling, simulation, and visualization. Includes applications in various phases of product creation and development; use of software and hardware interfaces to improve use and understanding of simulations; and current topics and future directions in modeling, simulation, and visualization.

EGR 230 Discrete Event Simulation
60 Hours 4 Credits
Introduces fundamentals of modeling and simulating discrete-state, event-driven systems. Includes basic simulation concepts and terms, queuing theory models for discrete event systems, structure of discrete event simulations, problem formulation and specification, input data representation, output data analysis, verification and validation, and the design of simulation experiments.

MOLDER

A5721 Foundry Processes
40 Hours 3 Credits
The scope of this course covers the fundamental processes of metal casting in the Newport News Shipbuilding Foundry. It includes a look at the history of the Foundry and begins with the design parameters originating in the Pattern Shop and includes all processes of the Foundry through the Inspection Process. The goal of this course is to equip Foundry Apprentices with knowledge foundational to making intuitive decisions on the job. Proficiency is tested at all levels to validate learning using written tests that include applications for problem solving.

A5722 Blueprint Reading for Molders
15 Hours 1 Credits
This course is designed to encourage best practices for interpreting, visualizing and communicating industrial drawing contents. The sessions include learning the skills required to recognize the components of a drawing and their contents and be able to relate the parts to each other. Use of appropriate measuring tools, identifying and interpreting lines and symbols, recognizing and interpreting various drawing views, locating information blocks, introduction of necessary vocabulary and abbreviations, and fraction and decimal math computations are included. A comparison of a NNS drawing with a commercial drawing is also investigated. Proficiency evaluations include tests, sample drawings and models.

NON-DESTRUCTIVE TESTER

O381 Non-Destructive Testing (NDT) Theory
13 Hours 0 Credit
Includes the fundamental knowledge of NDT methods used to examine welds. Provides training in surface testing methods with magnetic particle, liquid penetrant, and eddy current testing, and volumetric/subsurface testing with radiographic and ultrasonic methods. Note: for qualification purposes only.

O382 Magnetic Particle Testing
40 Hours 2 Credits
Develops a general understanding of safe and efficient Magnetic Particle Testing methods. Including the terms, definitions, procedures and requirements involved in the Magnetic Particle Testing process.

O383 Electromagnetic Testing
40 Hours 2 Credits
Develops a general understanding of safe and efficient Electromagnetic testing methods. Including the term, definitions, procedures and requirements involved in the Electromagnetic Testing process

O384 Liquid Penetrant Testing
40 Hours 2 Credits
Develops a general understanding of safe and efficient Liquid Penetrant Testing methods. Including the terms, definitions, procedures and requirements involved in the Liquid Penetrant Testing process

O385 Radiography Testing
40 Hours 2 Credits
Develops a general understanding of safe and efficient Radiography Testing methods. Including the terms, definitions, procedures and requirements involved in the Radiography testing process.

O386 Ultrasonic Testing
40 Hours 2 Credits
Develops a general understanding of safe and efficient Ultrasonic Testing methods. Including the terms, definitions, procedures and requirements involved in the Ultrasonic Testing process.

OUTSIDE MACHINIST

X431 Machinery Installation Theory
40 Hours 3 Credits
Includes an introduction to measurement tools, drawings and blueprints, flanges, gaskets, fastener/material control, and identification and information on shop machines and portable machines. Also covered in this course are the care and handling of machines and the safety requirements for working with rotating machinery. Finally, students taking the class will get a short overview of the material that will be covered in the X433 Ship Systems course.

X432 Introduction to Hydraulics

30 Hours 2 Credits

With specific applications to shipboard environments, covers introductory hydraulics which includes air and fluid power principles, hydraulic power system components, different types of hydraulic fluids, hydraulic strainers and filters, hydraulic reservoirs and accumulators, hydraulic piping, tubing and fittings, hydraulic directional control valves, hydraulic pressure control valves, hydraulic cylinders, hydraulic motors, rotary activators, and system troubleshooting.

X433 Ship Systems

40 Hours 3 Credits

This course is intended to provide each student in-depth knowledge of various major shipboard systems. The following topics will be covered in the course: Hydraulic systems, Aircraft Carrier (Navigation/Surveillance/Weapons systems); Submarine (Surveillance and Weapons systems); Main Propulsion systems; Auxiliary systems; Aircraft Carrier (Deck Machinery); and, Aircraft Launch and Recovery systems (ALRE).

PATTERNMAKER

M711 Patternmaker's Theory

60 Hours 4 Credits

This is a blended course in which the students gain knowledge and understanding of all the types of work a patternmaker is required to know how to do, including patternmaking for the Foundry and various kinds of woodworking. Practical applications are made including the actual operation of Pattern Shop machines and tools as well as the construction of 6 different patterns from a single layout.

A5721 Foundry Processes

40 Hours 3 Credits

The scope of this course covers the fundamental processes of metal casting in the Newport News Shipbuilding Foundry. It includes a look at the history of the Foundry and begins with the design parameters originating in the Pattern Shop and includes all processes of the Foundry through the Inspection Process. The goal of this course is to equip Foundry Apprentices with knowledge foundational to making intuitive decisions on the job. Proficiency is tested at all levels to validate learning using written tests that include applications for problem solving.

PIPEFITTER

X421 Introduction to Pipefitting

24 Hours 1 Credit

Provides the apprentice with an understanding of basic hand tools, material identification (pipe / fittings / valves), trade math, and rule reading / measurement.

X422 Blueprint Reading Fundamentals and Procedures

24 Hours 1 Credit

Provides the apprentice with the basic principles of blueprint reading and procedures used in pipefitting. Areas covered include blueprint terminology and navigation, drawing scales, material lists, welding, brazing, and NDT procedures.

X423 Sketching and Bending Fundamentals

60 Hours 3 Credits

Provides the apprentice with the principles of sketching and bending for various piping configurations. Areas covered include determining sizes of bending heads, true lengths between bends, calculating roll and bend angles, bending flat and rolling offsets, and determining bent pipe characteristics mathematically.

X424 Piping Systems
12 Hours 1 Credit
Provides the apprentice with principles of shipboard piping systems and their operation. Piping systems discussed include propulsion, seawater, hydraulics, plumbing drains, potable water, lube oil, JP-5, and various nuclear piping components and systems in shipbuilding

RIGGER

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X361 Stagebuilding, Blocking, and Shoring Theory
30 Hours 2 Credits
Provides the apprentice with a basic understanding of rigging safety, stagebuilding, blocking, and shoring for new ship construction and overhaul.

X362 Lifting and Handling Equipment Theory
30 Hours 2 Credits
Provides the apprentice with a basic understanding of rigging safety, lifting/handling equipment and the development of lift plans used in new ship construction and overhaul.

X363 Mooring and Ventilation Theory
31 Hours 2 Credits
Provides the apprentice with a basic understanding of safe handling of ship lines during the mooring process of ships and submarines as well as an overview of the procedures and calculations needed to design and install proper ventilation for ship construction and overhaul.

SHEET METAL WORKER

X321 Blueprint and Group Sheet Reading
15 Hours 1 Credit
Provides the apprentice with a thorough knowledge of basic print reading and grouping that is essential to the sheet metal trade. This course covers fundamental drawing information, including isometric and orthographic objects, weld symbols, ship terms and abbreviations, scaling, types and parts of drawings, and work packages. Also includes interpreting group sheets and computer bills of material.

X322 Materials, Machine Processes, Drilling and Tapping
20 Hours 1 Credit
Exposes the apprentice to various sheet metal materials as well as the machinery and processes involved in the fabrication and installation of sheet metal products. This course includes material identification and characteristics along with types of fasteners and pipe sizes. In addition, the course covers basic sheet metal tools and machines, machine processes, shielded metal arc welding, drilling, and tapping operations, with emphasis placed on safe work practices.

X323 Sheet Metal Layout
18 hours 1 Credit
Introduces the apprentice to the concepts of planning, designing, and shaping complex sheet metal components using applied math and geometry. This course covers sheet metal and heavy metal layout for breaking, forming, rolling, and notching to form material into three dimensional objects and components. The course includes square breaks, radius breaks, and rolling by hydraulic presses, hand brakes, and hand and power rollers, with an emphasis on safe, efficient work practices.

X324 Advanced Print Reading
34 Hours 2 Credits
Provides a wide-ranging exposure to the sheet metal blueprints and drawings that relate to specific areas of shipbuilding, including carriers, submarines, and shops. This course provides comprehensive instruction on a variety of Sheet Metal drawings including the

information and makeup of 24 different arrangement, detail, and list drawings. Additional topics include the major categories of work performed in the Sheet Metal Department.

SHIPFITTER

X111 Hull Construction I
18 Hours 1 Credit
Develops a general understanding of safe and efficient shipbuilding manufacturing practices and the tools involved in these practices. Includes hull trade apprentice shipyard safety responsibilities, tools of the trade, ship nomenclature, hull construction, basic ship lines, structural shapes, fractions and plate weight conversions. Also includes, interpretation of drawings, work packages, material layoff, joint fit-up, workmanship, and weld symbols.

X113 Hull Construction II CVN Drawings and Work Packages
8 Hours 1 Credit
Develops an understanding of efficient shipbuilding manufacturing practices through detailed drawing and work package interpretation. Includes analysis of carrier construction documents.

X114 Hull Construction II VCS Drawings and Work Packages
8 Hours 1 Credit
Develops an understanding of efficient shipbuilding manufacturing practices through detailed drawing and work package interpretation. Includes analysis of submarine construction documents.

X115 Hull Construction III
24 Hours 1 Credit
Develops a more advanced understanding of safe and efficient shipbuilding and manufacturing practices. It builds on information, skills and experiences gained in X111 and rotation experiences. It offers more specific application of tool safety, math calculations, material layoff, and joint fit-up and workmanship.

WELDER

X111 Hull Construction I (See SHIPFITTER)

X183 Welding Fundamentals: SMAW and GMAW
18 Hours 1 Credit
Develops a general understanding of safe and efficient welding practices and the tools involved in these practices. Includes shipyard safety, fundamentals of SMAW electrical circuits, terms and definitions, weld symbols, the structural joint numbering system, and proper welding sequence. Consists of an examination of GMAW components and electrical characteristics of the system.

X185 Introduction to Non Destructive Testing
8 Hours 1 Credit
Develops an academic and hands-on understanding of non-destructive weld testing techniques. Includes the most common types of weld discontinuities, the most commonly used NDT methods, and the advantages and limitations of each. The course also includes the interrelationships between welding processes, discontinuities, and inspection methods.

WELDING EQUIPMENT REPAIRER

All Electrical Theory Courses (See ELECTRICIAN)

World Class Shipbuilder Curriculum (WCSC)

BUSI 222 Business Operations and Leadership
47.5 Hours 4.5 Credits

Introduces business and leadership concepts with specific application to the shipbuilding industry and leadership principles of Newport News Shipbuilding. Includes topics such as, product mix, business strategies, contracts, process improvement, quality programs, shipbuilding economics, teams and teamwork, communications, the principles of leadership and corporate values.

COMM 111 Communications I
47.5 Hours 4.5 Credits

Prepares apprentices to meet written and oral demands of a business environment. Includes instruction in writing and speaking skills, with application to business communications such as, written reports and procedures, memorandums, and oral presentations. Microsoft Office applications are utilized for writing, editing, and preparation of presentation materials.

DRFT 111 Drafting
57 Hours 4.5 Credits

Exposes apprentices to the fundamentals and principles of engineering drafting as it relates to the shipbuilding industry. Skills taught include freehand sketching, and both 2D and 3D AutoCAD applications for orthographic projection, auxiliary and sectional views, isometric drawings, and solid modeling.

HIST 111 History
47.5 Hours 4.5 Credits

Examines the history of shipbuilding from its beginning with the advent of civilization through the modern era. Focus will be on shipbuilding in the United States and Newport News Shipbuilding, and the role shipbuilding played in The Apprentice School at Newport News Shipbuilding.

MATH 111 Mathematics I
57 Hours 4.5 Credits

Supports the craft training programs. It provides apprentices with the basic skills necessary to be successful in the mathematics, science, and engineering courses of their academic curriculum and prepares apprentices for future educational opportunities. It includes linear equations, factoring, algebraic fractions, exponents, roots, radicals, quadratic equations, graphing, systems of equations, and application-related principles/problems.

MATH 112 Mathematics II
57 Hours 4.5 Credits

Uses algebraic principles to solve shipbuilding applications of plane and solid geometry, right and oblique triangle trigonometry, and vector principles. Includes principles/problems from plane and solid geometry and trigonometry, Pythagorean Theorem, surface area and volume of various figures, trigonometric functions and solution of right triangles, oblique triangles using the Laws of Sines and Cosines, and vectors and equilibrium solutions of concurrent force systems. Prerequisite: MATH 111.

MECH 222 Mechanics
47.5 Hours 4.5 Credits

Mechanics builds the bridge between the analytical world of mathematics, science, and engineering and the practical world of shipbuilding design and construction. Includes application of free-body-diagrams (FBDs) to various force systems and the subsequent application of the equations of static equilibrium in finding the external support reactions of the FBDs. The reactions are used in strength of materials problems to determine the required dimensions of the various pieces of material.

PHYS 221 Physical Science I
57 Hours 4.5 Credits

Introductory physics course that integrates scientific theories with waterfront experiences. Topics include forces, velocity, acceleration, energy, work, power, and momentum (both translational and rotational modes), freely falling bodies, projectile motion, friction, centrifugal and centripetal forces.

PHYS 222 Physical Science II
57 Hours 4.5 Credits

Physical Science II is a continuation of physics introduced in Physical Science I. Topics include simple machines, the principles of fluids at rest and in motion. Emphasis is placed upon density, specific gravity, pressure, Pascal's law, Archimedes' principle, and Bernoulli's principle. The relationships between temperature change and the effect on the physical dimensions on material and the relationship among the various temperature scales is studied. Topics also include the quantity of heat, calorimetry, and latent heat. Prerequisite: PHYS 221.

PSYC 221 Psychology
42.75 Hours 4 Credits

Introduction to the basic psychology concepts of decision-making and evaluation of risk as it relates to safety in the shipbuilding environment and outside of work. The student is introduced to fundamental psychological concepts dealing with behavior; learning; perception; motivation; personality; and social processes. An emphasis is placed on application of these fundamental concepts of psychology as they contribute to the State to Error risk patterns outlined in the SafeStart Program and how to utilize Critical Error Reduction Techniques (CERT's) to reduce injuries.

SHCN 111 Ship Construction I
38 Hours 3.5 Credits

Introduces shipbuilding by providing a common vocabulary of shipbuilding terms, the basic elements of a ship, the concept of a process, the shipbuilding trades, and the company's quality program. Includes specific topics such as: the definition of a ship, ship's mission requirements, ship's hull design, drawings, lines and offsets, ship components of hull structure, the modern shipbuilding process and facilities, the fundamental force support systems, and the concepts of quality and process excellence used at NNS.

SHCN 222 Ship Construction II
38 Hours 3.5 Credits

Provides apprentices with an understanding of the typical propulsion plants and their associated components used in today's Navy. Includes the operation and major components of a ship's basic propulsion drive train including: resistances, a conventional steam cycle propulsion system, a pressurized water reactor propulsion system, a gas turbine propulsion system and a basic internal combustion propulsion system. Included are the scientific laws and principles involved. Prerequisite: SHCN 111.

SITE 211 Digital Shipbuilding and Technology
14.25 Hours 1 Credit

Introduces students to Integrated Digital Shipbuilding (iDS), Newport News Shipbuilding's vision to transform shipbuilding for the digital age. Apprentices will see demonstrations of the technologies NNS is using to create a future where shipbuilders will be constantly connected to a digital ecosystem of real-time accurate information, driving a new level of performance, making NNS a more attractive business, and providing our customer more ships at a reduced cost.

Trade Related Education Curriculum (TREC)

COATINGS SPECIALIST

X33C 111 Paint and Surface Preparation
56 Hours 5.5 Credits

Provides the apprentice with an understanding of safety, surface preparation, and typical paint installation techniques for new ship construction and overhaul. Describes the function and use of hand and mechanically operated trade tools used for surface coating calculation, preparation, application, and final surface presentation. Creating and maintaining safe work habits and conditions are stressed throughout the course.

X33C 112 Blueprint Reading for Painters
10 Hours 1 Credit

Instructs the apprentice in reading, interpreting, and applying painting information from blueprints and other construction documents to new ship construction and overhaul. Includes the principles necessary to interpret and apply information from various types of blueprints, schedules, data sheets, charts, procedures, and other job related documents. Includes compartment and access plans, deck and wall coverings, painting schedules, inspection procedures, other trade documents and forms.

X33C 135 Surface Preparation
360 Hours 12 Credits

Provides apprentices with experience in preparation of surfaces for coating. Apprentices will learn to safely remove paint using hand tools, power tools, solvents, and blasting. The surfaces will have to meet specific criteria in order to be ready for coating. This production work experience is conducted on surface ships and submarines. Pass or fail.

X33C 136 Coating and Finishing
300 Hours 10 Credits

Apprentices are given coating and finishing work experience on surface ships, submarines, and in shops. This experience uses a variety of coating systems with different criteria and procedures. Apprentices will learn to apply coating systems by using brush and roll methods. The apprentice is taught environmental monitoring to ensure that both safety procedures and application requirements are met. Pass or fail.

X33C 137 Inspection and Instrumentation
300 Hours 10 Credits

Once surfaces have been prepped and coated inspection is required to ensure that design specifications have been met to ensure long lasting protection. Apprentices will learn the coating system inspection process and how to interpret specifications. Apprentices also learn the proper use of inspection tools such as wet and dry film thickness gauges, adhesion gauges, and surface profile gauges. This work requires apprentices to inspect coated surfaces for sags, runs, holidays, dirt, and debris in accordance with drawings and procedures. Pass or fail.

COST ESTIMATOR

X06C 111 Fundamentals of Cost Estimation
300 Hours 10 Credits

Exposes apprentices to the basics of cost estimation by introducing the apprentice to different terminology and acronyms they will use on the job. They will also gain experience in various computer programs utilized in cost estimation. Apprentices will learn the

fundamentals of how to produce a fair and equitable quote of what it costs for the company to perform work. Apprentices will be shown the importance of quality of work, attention to detail, and working as a collaborative team in high stress situations. Pass or fail.

X06C 137 Cost Estimation – Initial Proposals
420 Hours 14 Credits

Provides work experience in creating cost proposals based on a Request for Quote (RFQ). This on- the- job training teaches apprentices how to read and interpret engineering documents to research and create cost proposals to be submitted to our customers. Apprentices will learn the importance of good communication skills and networking skills as they will have to defend their position as to why their estimates are fair and equitable. Apprentices will also be part of negotiations with customers on the contracts for the products we will be building. Pass or fail. Prerequisite: X06C 111.

X06C 139 Cost Estimation – Change Proposals
420 Hours 14 Credits

In this practical, apprentices will obtain experience creating change order proposals. These change orders will give the apprentice a fast- paced, high- volume work experience. Apprentices will utilize their researching skills to find information from previous work and reach out to other departments to get firsthand expertise. This experience will teach the importance of time management, organizational skills, and stress management. The importance of teamwork and attention to detail will be emphasized as apprentice work through these high-volume change order proposals. Pass or fail. Prerequisite: X06C 111.

ELECTRICIAN

X31 111 Applied Theory I: DC Concepts
90 Hours 7.5 Credits

Introduction to DC theory is a Prerequisite: for subsequent electrical theory classes as well as, a provider of essential information on electrical safety. This course introduces the effects of DC voltage, current and power in resistive circuits (including series, parallel, and series-parallel networks with emphasis on Kirchhoff's voltage and current laws), and voltage divider and current divider rules. Circuit analysis includes source conversion, mesh analysis, superposition, and Thevenin's and Norton's theorems. Practical lab exercises incorporate standard test equipment, classroom theory, troubleshooting skills, and electrical safety.

X31 112 Applied Theory II: AC Concepts
90 Hours 7.5 Credits

This course completes DC concepts by presenting transient effects of capacitors and inductors and discussing magnetic circuits. AC theory concepts and applications are introduced using general sinusoidal format for AC voltage, current, power and frequency as it applies to resistive and reactive series, parallel and series-parallel networks. Circuit analysis includes mesh analysis, superposition, and Thevenin's and Norton's theorems. Practical lab exercises incorporate standard test equipment, classroom theory, troubleshooting skills, and electrical safety. Prerequisite: X31 111.

X31 137 Electrical Installation – Surface Ships
180 Hours 6 Credits

In this practical, apprentices will obtain production work experience on surface ships. This includes learning the layout of surface ships and the various compartments and decks. Electrician apprentices will utilize work instructions, drawings, and direction from work control to layoff, install, cut-in, hookup and test shipboard electrical systems and equipment. Apprentices learn the importance of teamwork, collaboration, and how we work with our customers. The importance of on-the- job safety and quality of work is emphasized. Pass or fail.

X31 139 Electrical Installation – Submarines
180 Hours 6 Credits

Provides hands on work experience on a submarine. This on- the- job training teaches how to read and interpret submarine program work instructions and drawings and also emphasizes the importance of adhering to submarine methods of installation and quality requirements. Electrician apprentices will layoff, install, cut-in, hookup and test electrical systems and equipment. Instructors will explain how the systems work and train apprentices to ensure they meet engineering requirements. Pass or fail.

X31 212 Applied Theory III: Polyphase Systems and Controls
100 Hours 8 Credits

This course continues AC theory concepts including resonance, filters, AC power, polyphase systems and transformers. Information on motor controls begins with the principles and applications of DC and AC generators and motors and continues with examples of DC and AC electromechanical controls including schematic symbols, wiring and schematic diagrams, relays and contactors, motor overload devices, time delay circuitry, reduced voltage starting methods, and deceleration methods. The student learns the most effective methods and strategies used to troubleshoot complex electromechanical control systems through hands on laboratory exercises emphasizing electrical safety, electromechanical circuit design and troubleshooting. Prerequisites: X31 112.

X31 214 Programmable Logic Controllers
45 Hours 3 Credits

The course begins with an introduction to digital electronics including numbering systems, gate logic and combinational logic, and continues with applications of digital electronics through encoders, decoders, flip-flops and counters. The course continues with programming, hook-up and troubleshooting of programmable logic controllers (PLCs). Industry standard PLCs and programming software are used for specific training on ladder logic diagrams, input/output instructions, internal relays, timers, counters, compare and math functions, control instructions, sequencers, retrofitting, and program design. Prerequisite: X31 212.

HEATING & AIR CONDITIONING WORKER

X31 111 Applied Theory I: DC Concepts (See ELECTRICIAN)
X31 112 Applied Theory II: AC Concepts (See ELECTRICIAN)
X31 212 Applied Theory III: Polyphase Systems and Controls (See ELECTRICIAN)
X31 214 Programmable Logic Controllers (See ELECTRICIAN)

043H 145 Heating Ventilation and Air Conditioning
360 Hours 12 Credits

In this practical, apprentices receive training in basic refrigeration processes as well as sophisticated building climate controls systems throughout the plant. With an emphasis on safety they will utilized acquired qualifications for Lock-out/Tag-out procedures on electrical systems, CPR training, and Low Voltage certifications. They will also apply National Electrical Code as related to HVAC. HVAC apprentices will troubleshoot and repair a variety of small portable systems such as window units, environmental control systems for waterfront manufacturing and warehouses, and environmental control systems for engineering product development buildings. Pass or fail.

HEAVY METAL FABRICATOR

X11 111 Hull Construction I (See SHIPFITTER)

X15 112 Fundamentals of Fabrication
16 Hours 1.5 credit

Develops an understanding of efficient heavy metal fabrication machinery, processes, and procedures.

X15 135 Burning
360 Hours 12 credit

Exposes apprentices to a production work environment where they learn to safely use burning torches to cut flat metal into various shapes. Apprentices will learn to safely and properly hook up and operate a burning torch. Apprentices will learn to lay off shapes accurately in according with drawings and work instructions and to make cuts on various types of steels and shapes. Emphasis is placed on hot work safety and personal protective equipment. Numerically controlled burning machines are also used Pass or fail.

X15 137 Small Forming
360 Hours 12 credit

To meet the design criteria for the shape of a ship's hull, flat plates of steel must be pressed and formed into rounded shapes. The apprentice will learn the different processes used to form and shape metal such as bending, shearing, rolling, pressing, forging, and indenting. Apprentices will learn safety precautions when using hydraulic and electric heavy metal forming tooling such as rollers and presses. The apprentice will learn to layoff bend points and shaping locations in accordance with drawings and will operate heavy metal presses and rollers to accurately produce shapes of hull and structure. Pass or fail.

X15 139 Large Forming
360 Hours 12 credit

Forming large, thick steel plates is necessary for ship construction. The apprentice will learn the different processes used to form and shape metal such as bending, shearing, rolling, pressing, forging, and indenting on large machinery. Apprentices will learn safety precautions to be taken when using large hydraulic and electric heavy metal forming tooling such as rollers and presses. Pass or fail.

INSULATOR

X33I 111 Theory of Insulation
48 Hours 4.5 Credits

Provides apprentice with an understanding of safety, application and installation of insulation materials for new ship construction and overhaul. Describes the function and use of hand and mechanically operated trade tools used on various insulation compositions, application and installation, and safe work practices while working with hazardous materials.

X33I 112 Blueprint Reading for Insulators
10 Hours 1 credit

Instructs the apprentice in reading, interpreting, and applying insulation information from blueprints and other construction documents for new ship construction and overhaul. Documents used include various types of blueprints, schedules, data sheets, charts, and procedures.

X33I 135 Sound Damping
360 Hours 12 credit

Noise is the enemy of stealth. In order to make ships quiet the sound generated by machinery and other components must be quieted. Insulator apprentices learn how to install sound damping materials in accordance with drawings and procedures to ensure required noise cancelling levels are achieved. Apprentices will acquire skills in a production environment to successfully install different types of sound damping materials and install studs to support the materials. Apprentices will work in teams to complete quality work while learning the processes. Pass or fail.

X33I 136 Piping Insulation
300 Hours 10 credit

Piping on a ship carry a range of pressures and temperatures of fluids and gasses. Some systems need to stay warm and others need to stay cold. Insulator apprentices will learn how to install insulation onto piping systems and components to ensure efficient operation. The apprentice will acquire skills in reading and interpreting drawings and procedures, material handling, and mudding techniques. The importance of quality and safety are also taught. Pass or fail.

X33I 137 Bulkhead Insulation
300 Hours 10 credit

Exposes apprentices to production work experience installing insulation on bulkheads. Apprentices will learn to interpret work documents to determine correct insulation materials and requirements and to install different insulation materials and thicknesses based on the purpose of the space. Insulation installed by apprentices will be for climate control, sound control and acoustics, and habitability. Pass or fail.

MACHINIST

M53 111 Machinist Shop Theory
34 Hours 3 Credits

This course is designed to cover basic machine shop safety, hand tools, measuring tools (including precision measuring tools), metric measurement, tapers and angles, and basic machine theory. Included are tools and attachments for machines such as the drill press, shaper, slotter, planer, milling machine, and engine lathe. Identification of machines and their principal parts and machine operation are also covered. Apprentices will be introduced to drawings and cover basic shop work practices. Proficiency evaluations include tests.

M53 125 Machinist Fundamentals
360 Hours 12 Credits

Exposes apprentices to basic machining principles and concepts on drill presses, lathes, and milling machines. Machine shop safety is introduced and practiced. Apprentices will be shown how to read and interpret the sketch of a part and apply given tolerances. The importance of quality will be explained and why all parts must meet specification. Instructors will teach apprentices how to use indicators to properly secure metal stock to machine basic shapes. Standard measuring tools such as a steel rule, micrometers, calipers, and calibrated gauges will be applied to all machined parts. Machine cleanliness and tool care will be discussed during this training. Pass or fail.

M53 137 Machinist Practical - Milling
240 Hours 8 Credits

Provides hands on work experience on a milling machine. Apprentices will be expected to show competency in milling applications such as drilling and tapping holes, milling slots, precision boring, countersinking and counterboring. Instructors will discuss the geometry and different grades of carbide inserts and explain when each should be used. This enhances the apprentice's ability to plan and troubleshoot work. Production expectations will be introduced so apprentices understand time allocation and work flow. Pass or fail. Prerequisite: M53 125.

M53 139 Machinist Practical - Turning
240 Hours 8 Credits

Provides practical experience on a turning center. Apprentices will be expected to show proficiency in basic turning applications such as facing, turning, boring, drilling, and parting off. Instructors will explain the geometry of carbide inserts and advise when each should be used. Production drawings are introduced and apprentices will learn how to read and interpret them. This experience will reinforce the apprentice's ability to plan jobs from start to completion. Apprentices are expected to provide suggestions to problems they may encounter with their work. Pass or fail. Prerequisite: M53 125.

M53 222 Computer Numerical Control Programming/Lab
80 Hours 6 Credits

Introduces the concepts of Computer Numerical Controlled (CNC) programming. Apprentices will write detailed programs using G and M-code as they learn various machining operations. These operations include using fixed cycles and subroutines, linear and circular interpolation, tool radius compensation as well as modern touch-off approaches using electronic probing. This course includes an operator section to teach each student responsibilities of the programmer and specifics within the machine. This class is the second trade related theory course that all machine shop apprentices are required to complete. It provides knowledge of CNC programming which will allow the apprentice to read and analyze a numerically controlled program in order to run their first CNC machine successfully. Prerequisite: M53 111.

M53 223 Advanced Programming Lab
24 Hours 1 Credits

Uses a computer based Computer Numerical Controlled software to provide authentic operation and a part programming environment. This course will teach apprentices how to create part programs on a CNC machine with conventional G-code editors or using conversational programming. It will prepare apprentices to use programming software on the machines control. Advanced Programming will teach both milling and turning applications. Pass or fail. Prerequisite: M53 222.

MAINTENANCE ELECTRICIAN

X31 111 Applied Theory I: DC Concepts (See ELECTRICIAN)
X31 112 Applied Theory II: AC Concepts (See ELECTRICIAN)
X31 212 Applied Theory III: Polyphase Systems and Controls (See ELECTRICIAN)
X31 214 Programmable Logic Controllers (See ELECTRICIAN)

O43E 125 Maintenance Electrical Construction
360 Hours 12 Credits

In this practical, apprentices receive training in general industrial electrical construction throughout the plant through both practice and production work. With an emphasis on safety they will initially acquire qualifications for Lock-out/Tag-out procedures on electrical systems, CPR training, and Low Voltage certifications. They will also study the National Electrical Code to learn the standards for installations of electrical components. Apprentices will install a wide range of electrical systems consisting of switches, disconnects, receptacles, lights, and they will learn the art of conduit bending, mounting and wire/cable installation. Pass or fail.

MAINTENANCE PIPEFITTER

X42 111 Introduction to Pipefitting (SEE PIPEFITTER)
X42 113 Blueprint Reading Fundamentals and Procedures (SEE PIPEFITTER)
X42 121 Sketching and Bending Fundamentals (SEE PIEPFITTER)
X42 125 Pipefitting Fundamentals 141 Shipyard Utilities (See PIPEFITTER)

O43P 140 Piping Facilities
450 Hours 15 Credits

Provides hands on work experience with plumbing and pipefitting to support shipyard operations. Apprentices will work with city water systems, temporary ship services, river water, restrooms, and their associated components. The apprentice will learn to interpret diagrams and drawings, find flow restrictions, and successfully install and test piping systems and components. Pass or fail. Prerequisite: X42 125.

O43P 141 Shipyard Utilities
420 Hours 14 Credits

Provides practical work experience supporting the numerous services needed for successful shipyard production. Apprentices will learn the operation, production, and maintenance of steam, service air, inert gas, nitrogen, and flammable gas services. The apprentice will also work on the sewer and drain system, and roads and grounds. The apprentice will learn to work in a team environment to successfully produce first time quality work. Pass or fail. Prerequisite: X42 125.

MARINE DESIGNER

E06 125 Marine Design Fundamentals
420 Hours 14 Credits

This work experience exposes apprentices to the basics and perspectives of engineering and designs for a large industrial manufacturing company. Instructor-led training will include an introduction to 2D and 3D design software to prepare the apprentice for design production work. Marine Design apprentices will learn the fundamentals of design elements, manufacturing processes, and integrated manufacturing. This training includes skill development in design applications for the installation of structural, electrical, machinery, piping, and ventilation components aboard ship as well as concepts for non-nuclear, naval applications utilizing various materials through liaison support mechanisms. This prepares apprentices to develop and modify electronic plans which support electronic 2D and 3D drawings used in production, manufacturing and design processes. Pass or fail.

E06 137 Marine Design - Submarines
360 Hours 12 Credits

Provides hands on work experience to support the submarine program in engineering and design. This on- the- job training teaches apprentices to develop and modify electronic plans and drawings. Marine Design apprentices prepare a variety of engineering documents such as visual work instructions, liaison reports, discrepancy items, and equipment purchase orders. Apprentices utilize the training received in Marine Design Fundamentals to produce drawings for manufactured structures, systems, and machinery. Apprentices will utilize engineering and design tools and resources to include computer aided drafting and design software and specification/technical libraries. Apprentices will apply their knowledge of the submarine manufacturing process to assist engineering and trades to meet job requirements. Apprentices build on the importance of teamwork and collaboration to support our customers. Pass or fail. Prerequisite: E06 125.

E06 139 Marine Design – Surface Ships
360 Hours 12 Credits

In this practical, apprentices will obtain production work experience in engineering and design programs for surface ships. This on-the- job training teaches apprentices how to develop and modify electronic plans and drawings. Marine Design apprentices also prepare a variety of engineering documents such as visual work instructions, liaison reports, discrepancy items, and equipment purchase orders. Apprentices utilize the training received in Marine Design Fundamentals to produce drawings for manufactured structures, systems, and machinery. Apprentices will utilize engineering and design tools and resources to include computer aided drafting and design software and specification/technical libraries. Apprentices will apply their knowledge of the surface ship manufacturing process to assist engineering and trades to meet job requirements. Apprentices build on the importance of teamwork and collaboration to support our customers. Pass or fail. Prerequisite: E06 125.

METROLOGY TECHNICIAN

O68 111 Industrial Measurement - Instrumentation
80 Hours 5.5 Credits

This course covers tasks associated with performing on-site visual inspections of components to determine measurement methodology, planning and coordinating phases of the measurement survey process and analyzing and interpreting data. This is an introduction and orientation to industrial measurements in a large manufacturing and industrial setting. This course will take a hands-on approach in which most the time will be spent using metrology equipment and applicable software. Specific metrology equipment includes care and handling, compensation, and utilization of total Station, laser tracker, photogrammetry, coordinate measurement machines and precision measurement instruments. An overview of the department, laser safety, and ergonomics will be covered. The departmental and industry best practices and procedures for surveying, analyzing, reporting, and checking processes will be discussed throughout the course.

O68 125 Metrology Fundamentals
360 Hours 12 Credits

Exposes apprentices to the basics of Metrology work in an industrial environment. Apprentices will learn the fundamentals of planning, data collection, analysis, and reporting. Importance of safety, quality of work, instrumentation set-up, and job planning is taught. This training includes skill development of alignment, line layoff, pre-cut, pipe details, liners, and general inspection. Dimensional Control apprentices will perform industrial measurement surveys and detailed analysis of manufactured structures, components, and assemblies for surface ships and submarines. This experience prepares apprentices to work safely in a production environment by utilizing proper work methods. Pass or fail.

O68 137 Metrology Technician Practical - Submarines
240 Hours 10 Credits

Provides hands on work experience for the submarine program. This on the job training teaches apprentices how to read and interpret electronic accuracy control plans and drawings. Apprentices utilize the training received in Industrial Measurement-Instrumentation to perform industrial measurement surveys utilizing metrology instrumentation. Apprentices will utilize 3D software to perform analysis of manufactured structures, components, and assemblies for submarines. Apprentices will understand submarine design and as-built tolerances to ensure engineering and job requirements are met. Apprentices learn the importance of teamwork, collaboration, and how we work with our customers. Pass or fail. Prerequisite: O68 111.

O68 139 Metrology Technician Practical – Surface Ships
240 Hours 10 Credits

In this practical, apprentices will obtain production work experience on surface ships. This on the job training teaches apprentices how to read and interpret electronic accuracy control plans and drawings. Apprentices utilize the training received in Industrial Measurement-Instrumentation to perform industrial measurement surveys utilizing metrology instrumentation. Apprentices will utilize 3D software to perform analysis of manufactured structures, components, and assemblies for surface ships. Apprentices will understand surface ships design and as-built tolerances to ensure engineering and job requirements are met. Apprentices learn the importance of teamwork, collaboration, and how we work with our customers. Pass or fail. Prerequisite: O68 111.

MILLWRIGHT

M53 111 Machinist Shop Theory (See MACHINIST)

M53 125 Machinist Fundamentals (See MACHINIST)

043M 137 Millwright Practical – Crane Maintenance
300 Hours 10 Credits

Allows apprentices to gain hands on work experience in crane maintenance. The fundamentals of crane maintenance will be taught and each apprentice will have the opportunity to apply their skills. The apprentice will be working alongside experienced crane mechanics and crane engineering. Apprentices will have the opportunity to perform preventative maintenance and repairs of various types of cranes. This practical allows them to work on gantry cranes, whirley cranes, and mobile cranes that support our shops, dry docks, and piers. Tasks range from crane lubrication to drivetrain and brake work. Pass or fail. Prerequisite: M53 125.

043M 139 Millwright Practical – Equipment Maintenance
360 Hours 12 Credits

Provides millwright apprentices experience working on industrial equipment and performing routine machine maintenance. Experience is gained while working alongside experienced millwrights and receiving instruction from facilities engineering. Exposure to preventative maintenance teaches the apprentices how to properly care for hydraulic, pneumatic, and air powered equipment. Apprentices will also work on critical pieces of equipment in need of repair to support shops, piers, and dry docks. During this time they will learn how to troubleshoot and find the root cause of problems. Pass or fail. Prerequisite: M53 125.

043M 221 Introduction to Hydraulics
30 Hours 2 Credits

Provides an understanding of hydraulic systems, associated components, and their schematics found in the shipyard. Covers introductory hydraulics including air and fluid power principles, hydraulic power system components, different types of hydraulic fluids, hydraulic strainers and filters, hydraulic reservoirs and accumulators, hydraulic piping, tubing and fittings, hydraulic directional control valves, hydraulic pressure control valves, hydraulic cylinders, hydraulic motors, and rotary activators. Prerequisite: M53 111.

MODELING AND SIMULATION PROGRAM ANALYST

X06M 125 Modeling and Simulation - Fundamentals
420 Hours 14 Credits

Apprentices will learn the aspects and requirements to collect and input data for use in a simulation. Software will be used in conjunction with data collection and presentation as a part of various projects and classroom experiences. Apprentices will also be exposed to programming language. Small programs will be written to gain an understanding of the basic coding requirements to develop a simulation. The agile management techniques that are used within the industry and department will be explained to understand the roles and responsibilities of the team members. This rotation will enhance apprentices' verbal communication skills by participating in meetings to elaborate on the status of assigned projects. Pass or fail.

X06M 137 Modeling and Simulation - Development
360 Hours 12 Credits

Apprentices will use various software and programming techniques to develop models and simulations to satisfy the needs of the customer. A representation of the system will be used to study attributes which cannot be accomplished easily with the real system or in real-time. The type of model can be developed in various forms, but is typically accomplished using a digital model. The development of the model and simulation is accomplished by using a system of equations which identifies the specific parameters of the system. The concepts of the agile management techniques will be applied to obtain the solution for the customer. This includes teamwork, collaboration, and leadership experience on the portion of the project assigned. Communication skills will be enhanced through conversations with customers on the problem faced to determine the best methodology to generate the desired solution. Pass or fail. Prerequisite: X06M 125.

X06M 139 Modeling and Simulation - Analysis
360 Hours 12 Credits

Apprentices will use various software programs to perform the analysis of the optimized solution. The output of the data produced will need to be evaluated to determine if the results match the preconceived notion of what the final results should be. This may involve statistical analysis, testing, and troubleshooting the entity developed. The different solutions will need to be analyzed based on the requirements and needs of the customer. The apprentice will be expected to communicate the results with the customer to verify the data and output achieves the goal of the simulation. The final output will need to be formatted to present the solution to the customer. Pass or fail. Prerequisite: X06M 125.

MOLDER

A572 111 Foundry Processes
30 Hours 3 Credits

This course covers the fundamental processes of metal casting in a foundry. It includes a look at the history of the foundry and begins with design parameters originating in the Pattern Shop and includes all processes of the foundry through the inspection process. The goal of this course is to equip foundry apprentices with knowledge foundational to making intuitive decisions on the job. Proficiency is tested at all levels to validate learning using written tests that include applications for problem solving.

A572 112 Blueprint Reading for Molders
15 Hours 1.5 Credits

This course encourages best practices for interpreting, visualizing and communicating industrial drawing contents. The sessions include learning the skills required to recognize the components of a drawing and their contents and be able to relate the parts to each other. Use of appropriate measuring tools, identifying and interpreting lines and symbols, recognizing and interpreting various drawing views, locating information blocks, introduction of necessary vocabulary and abbreviations, and fraction and decimal math computations are included. A comparison drawings is also conducted. Proficiency evaluations include tests, sample drawings and models.

A572 137 Foundry Molding
360 Hours 12 Credits

Apprentices will use patterns in the shape of a final part to create molds out of sand. These molds are then filled with molten metal and cooled to become a casted part. This work experience teaches apprentices how to read and interpret sketches and then build a mold according to instructions. The training will include production work on set up, washing and dressing of patterns, building of gates and risers, mold building and sand compacting for castings. Apprentices also learn the proper way to pull patterns from a mold. Pass or fail.

A572 138 Foundry Melting Operations
360 Hours 12 Credits

This training teaches apprentices how to properly heat metal prior to pouring it into a sand mold. Apprentices will learn to inspect molds, heat metal to a molten state, and pour it in sand molds to create a metal casting. In this training, apprentices are able to cast ferrous and non-ferrous metal alloys. Along with the melting processes, apprentices learn to brick line ladles and decarburization vessels, run production heats, and clean furnaces and ladles after pours. Instructors also emphasize the importance of proper metallurgy, heating, and cooling of metals. Pass or fail.

A572 139 Foundry Finishing and Inspection
300 Hours 10 Credits

After a casting has been poured and cooled, it has to go through a rigorous finishing and inspection process. Apprentices will learn to finish castings by burning and arcing leftover risers and gates, grinding and chipping to fair shapes and remove defects, and blasting. The casting will be inspected using visual, dimensional, particle, and chemical inspection techniques to find flaws and porosity. The flaws found will then be repaired and inspected to ensure quality. Molder apprentices will learn each of the processes mentioned as well as learning about safety and quality in their work. Pass or fail.

NON-DESTRUCTIVE TESTER

X11 111 Hull Construction I (See SHIPFITTER)

O38 137 Magnetic Particle Inspection
360 Hours 12 Credit

Exposes apprentices to production experience inspecting for surface defects and discontinuities using magnetic yoke or prod on carbon materials. Apprentices will work under the supervision of a qualified inspector until certification is achieved. Apprentices work in shops and on ships while learning safety, quality, cost and schedule standards. The apprentice will learn to work in a team environment to inspect in accordance with drawings, procedures, and technical specifications. Pass or fail.

O38 139 Liquid Penetrant Inspection
420 Hours 14 Credits

Weld joints need to be inspected for cracks and defects which can be achieved by the liquid penetrant process. Apprentices will work under tutelage of a qualified inspector to check welds on ships and in shops. Apprentices work towards receiving their liquid penetrant testing qualification. This makes apprentices efficient and competent to inspect welds to ensure they withstand designed stresses. Apprentices follow procedures and work instructions to verify all correct criteria is met. Pass or fail.

O38 141 Ultrasonic Testing
300 Hours 10 Credits

Ultrasonic testing is a non-destructive technique used to inspect metals for discontinuities using ultrasonic waves. Apprentices will use a Pulse Echo Receiver and a probe, called a transducer, to transmit ultrasonic pulse waves into materials to detect internal flaws and material thickness requirements. This work experience will be performed in both shops and shipboard applications. They will spend time being properly trained, certified and be given several opportunities to apply their training. Pass or fail.

NUCLEAR TEST TECHNICIAN

E06T 111 Nuclear Test Technician Fundamentals
300 Hours 10 Credits

Exposes apprentices to the basics of how a nuclear reactor works and procedures for testing. During this time apprentices will sit through instructor- led training for new hires and quality assurance. Apprentices will learn the fundamentals of the components that will be tested. Instructors teach the importance of safety, quality of work, cleanliness, and job planning. This experience prepares apprentices to work safely in a production environment by utilizing proper work methods. Pass or fail.

E06T 137 Nuclear Testing and Work Control - Submarines
420 Hours 14 Credits

Provides hands on work experience on a submarine program. This on-the-job training teaches apprentices how to read, write and interpret technical work documents, testing procedures and work authorizations. Apprentices utilize the training received in Nuclear Test Technician Fundamentals to assist on performing tests on both nuclear and non-nuclear systems. Apprentices will be required to facilitate, explain, and perform tests on different components. Lead Test Engineers and Shift Test Engineers will explain how the systems work and train apprentices to ensure they meet engineering requirements. Pass or fail. Prerequisite: E06T 111.

E06T 139 Nuclear Testing and Work Control – Surface Ships
420 Hours 14 Credits

In this practical, apprentices will obtain production work experience on aircraft carriers. This experience will allow apprentices to use knowledge they learned about the ship layout. Apprentices will interact closely with our customers and other trades to ensure all testing is performed within guidelines. Apprentices learn the importance of good communication skills, teamwork, and deadlines. The importance of system cleanliness and quality of work is continually being emphasized no matter the task they are performing. Pass or fail. Prerequisite: E06T 111.

OUTSIDE MACHINIST

X43 111 Machinery Installation Theory
40 Hours 4 Credits

Includes an introduction to measurement tools, drawings and blueprints, flanges, gaskets, fastener identification, material control, and shop and portable machines. The proper care and handling of machines and the safety requirements for working with rotating machinery is covered. Finally, students taking the class will get a short overview of the material that will be covered in the X43 212 Ship Systems course.

X43 125 Outside Machinist Fundamentals
240 Hours 8 Credits

Exposes apprentices to the basics of outside machinist work in a shop environment. Apprentices will learn the fundamentals of basic hand tools, layout, drilling, tapping, boring, precision measuring tools, grinding, assembling parts, and pump alignments. Instructors teach the importance of safety, quality of work, cleanliness, and job planning. This training includes numerous qualifications needed for production work such as lockwire, pump alignment, flange facing, and valve packing. This experience prepares apprentices to work safely in a production environment by utilizing proper work methods. Pass or fail.

X43 137 Machinery Installation - Submarines
300 Hours 10 Credits

Provides hands on work experience on a submarine program. This on-the-job training teaches apprentices how to read and interpret work instructions and drawings. Apprentices utilize the training received in Outside Machinist Fundamentals (X43 125) to set and layout equipment with dimensional control support and drill precision holes for equipment installations. Apprentices will be required to take liner sizes to make up the gaps between the foundations and the equipment location. Once the liners are received, apprentices will secure the equipment in its final location. Instructors will explain how the systems work and train apprentices to ensure engineering requirements are met. Pass or fail. Prerequisite: X43 125.

X43 139 Machinery Installation – Surface Ships
360 Hours 12 Credits

In this practical, apprentices will obtain production work experience on surface ships. This includes learning the layout of surface ships and the various compartments and decks. Outside machinist apprentices will utilize work instructions, drawings, and direction from work control to assemble, repair, and operate systems. Apprentices learn the importance of teamwork, collaboration, and how we work with our customers. The importance of system cleanliness and quality of work is emphasized. Other skills experienced during this course will include flange make up and valve operations. Pass or fail. Prerequisite: X43 125.

X43 212 Ship Systems
40 Hours 4 Credits

This course is intended to provide each student in-depth knowledge of various major shipboard systems and their operation. The following topics will be covered in the course: Hydraulic systems, Aircraft Carrier (Navigation/Surveillance/Weapons systems); Submarine (Surveillance and Weapons systems); Main Propulsion systems; Auxiliary systems; Aircraft Carrier (Deck Machinery); and, Aircraft Launch and Recovery systems (ALRE). Prerequisite: X43 111.

PATTERNMAKER

A572 111 Foundry Processes (see MOLDER)

A572 112 Blueprint Reading for Molders (see MOLDER)

M71 111 Patternmaker's Theory
15 Hours 1.5 Credits

This course will introduce patternmaker's history in shipbuilding and the basics of pattern making. The course is taught using instructor-led lectures with a series of quizzes and tests to ensure proficiency. Patternmaker's theory will provide an overview of history, patternmaker responsibilities, machine safety, procedures, pattern types, shop products, woodworking, box molds, and foundry knowledge.

M71 136 Woodworking
300 Hours 10 Credits

Patterns are made out of different woods and synthetic materials therefore the operation of woodworking and tools is vital to an apprentice's success. Apprentices will learn how to safely use basic hand tools such as saws, planes, rules, and chisels. Instructors will also demonstrate the use of power machine tools including saws, jointers, planers, drill presses, and sanders. The importance of accurate measurement will be emphasized and practiced. Synthetic materials used include lexan, plexiglass, and arboron. Patterns created will be used in the foundry to form molds and apprentices will learn the importance of material and time management. Instructors will emphasize machine safety and proper tool care. Pass or fail.

M71 137 Pattern Construction
360 Hours 12 Credits

Proper pattern construction is vital to a quality casting. Apprentices will learn how to construct and inspect outer patterns and cores. Instructors will teach apprentices how to use drawings to lay out and construct patterns. Build methods include staved, solid, segmented, and collapsible on small to large patterns. Core construction and prints will be taught as well as hands on experience refurbishing patterns. Apprentices learn the importance of quality and working together as a team. Pass or fail.

M71 139 Foundry Operations
300 Hours 10 Credits

To better understand the role of patterns in creating castings, apprentices perform a rotation in the foundry and become a customer to the pattern shop. This ensures understanding of the importance of a pattern's quality. Work experience includes molding, inspection, production control, and planning. Apprentices learn sand compaction, mold dressing, and gate and riser setup where they directly work with the patterns their shop produces. The inspection, production control, and planning work gives the apprentice a better understanding of what goes on ensure work flows smoothly. Pass or fail.

PIPEFITTER

X42 111 Introduction to Pipefitting
24 Hours 2 Credit

Provides the apprentice with an understanding of basic hand tools, material identification (pipe / fittings / valves), trade math, and rule reading / measurement.

X42 113 Blueprint Reading Fundamentals and Procedures
24 Hours 2 Credit

Provides the apprentice with the basic principles of blueprint reading and procedures used in pipefitting. Areas covered include blueprint terminology and navigation, drawing scales, material lists, welding, brazing, and non-destructive testing procedures. Prerequisite: X42 111.

X42 121 Sketching and Bending Fundamentals
60 Hours 3.5 Credits

Provides the apprentice with the principles of sketching and bending various piping configurations. Areas covered include determining sizes of bending heads, true lengths between bends, calculating roll and bend angles, bending flat and rolling offsets, and determining bent pipe characteristics mathematically. Prerequisite: X42 113.

X42 125 Pipefitting Fundamentals
60 Hours 2 Credits

Exposes apprentices to the basics of pipefitting work in a shop environment. Apprentices learn the operation of hand tools and power tools and be taught to measure, cut, bend, fit, and end-prep pipes. Apprentices learn to cut pipe square and straight using grinders, saws, and cutting machines and to prep ends for welding. Apprentices will learn how to bend and fit a pipe to a drawing and tack weld it in place. Safety skills in a production environment are stressed. Pass or fail.

X42 137 Pipefitting – Surface Ships
420 Hours 14 Credits

Provides work experience on surface ships allowing apprentices to apply knowledge learned in X42 125 in a production environment. Apprentices will install pipe detail assemblies, hangars, and fabricate pipes in place. Work will be accomplished in accordance with drawing and procedure specifications while ensuring the piping systems and components are kept free of debris and foreign material. Pass or fail. Prerequisite: X42 125.

X42 139 Pipefitting – Submarines
420 Hours 14 Credits

Provides work experience on submarines in the installation of piping systems. Apprentices work to meet drawing criteria in a team setting while learning to fit piping and weld hangers within tolerance. Apprentices will tack weld joints and hangers, install mechanical fittings, and groom piping systems to be turned over for inspection and testing. The apprentice will learn to inspect jobs for completion and errors. Pass or fail. Prerequisite: X42 125.

PRODUCTION PLANNER

X06P 135 Production Planning - Scheduling
420 Hours 14 Credits

Apprentices will gain experience using various software programs to perform scheduling functions for shipbuilding work. Business management terminology will be explained to gain an understanding of the critical path and the corresponding impact to the schedule if modifications to workable dates are required. The production capacity constraints are explored and incorporated into the project schedule. This rotation will enhance the apprentices' written and verbal communication skills when supporting customers to identify the job requirements and sequences needed for production. Pass or Fail

X06P 137 Production Planning – Build Management
480 Hours 16 Credits

Apprentices will gain experience in incorporating product manufacturing information into product models to create work instructions in support of shipbuilding operations. Work sets, visuals, and data will assist with a detailed project plan in an integrated system to provide information for the critical chain. The focus is on maximizing production workflow through constraining work activities and proper use of resources. Additionally, this rotation will provide a foundation in planning through drawing breakdown, bill of material analysis, preparation of build sequences, footprint scheduling, and other detail specific tasks associated with work scope execution. This rotation will build upon the importance of effective communication and collaboration to accomplish jobs efficiently. Pass or Fail.

X06P 139 Production Planning – Production Control
240 Hours 8 Credits

Apprentices will provide support to the construction team to assist in work package development and implementation. Production control experience contributes to the overall level of competency by offering a hands-on application of planning products which are utilized in material management, regulating work in process, and realizing throughput. This experience emphasizes the importance of communication with internal customers and enables the apprentice to visualize how products are progressed from a value stream perspective. This will emphasize the importance of effective communication skills and will afford an opportunity to provide direct support to the customers of the production planning organization. Pass or fail.

RIGGER

X36 135 Stagebuilding and Safety
240 Hours 8 Credits

Staging is required for trades to work safely at elevated heights. A rigger apprentice will work on surface ships, submarines, and in shops to build adequate support and staging. Apprentices will learn the proper techniques, tools, and requirements to build safe staging. The apprentice will get experience with steel and wood trestles, scaffolding, frame staging, and suspended platform staging. The apprentice will learn and be able to demonstrate the ability to understand and follow pertinent sketches and drawings and complete inspection and discrepancy reports. Certification is given deeming the apprentice proficient in stagebuilding. Pass or fail.

X36 137 Lifting and Handling - Ship
300 Hours 10 Credits

Equipment and machinery must be rigged on location inside of ships where a traditional crane cannot access. Rigger apprentices will learn proper lifting and handling techniques of material and equipment. The apprentices learns to spot lift pads, establish appropriate lifting points, use approved materials to lash equipment to be moved, utilize proper equipment to lift and carry equipment through a ship and assist other trades with the installation of equipment. The apprentice will also learn to establish a proper lift plan and work to engineering instructions. This learning experience is in a production work environment. Pass or fail.

X36 139 Lifting and Handling - Cranes
360 Hours 12 Credits

Equipment and machinery must be rigged on location inside of ships where a traditional crane cannot access. Rigger apprentices will learn proper lifting and handling techniques of material and equipment. The apprentices learns to spot lift pads, establish appropriate

lifting points, use approved materials to lash equipment to be moved, utilize proper equipment to lift and carry equipment through a ship and assist other trades with the installation of equipment. The apprentice will also learn to establish a proper lift plan and work to engineering instructions. This learning experience is in a production work environment. Pass or fail.

X36 211 Stagebuilding, Blocking, and Shoring Theory
34 Hours 3 Credits

Stage Building, Blocking and Shoring theory will cover terms, procedures and techniques for the safe installation of staging and support of vessels under construction and dry-docking operations. Topics will include calculating loads, blocking drawings, applicable staging forms, and principal types of staging. By the completion of the course, students will be able to design staging using present technology.

X36 212 Lifting and Handling Equipment Theory
32 Hours 3 Credits

Lifting and Handling Theory will cover the terms, tools, procedures most often used by X36 for safe rigging operations. It will include load and center of gravity calculations, evaluating and resolving scenarios. At the conclusion of the course, students will be able to develop a lift plan in teams and individually.

X36 213 Mooring and Ventilation Theory
34 Hours 3 Credits

The mooring section of this course is designed to provide a general knowledge of the mooring process of both aircraft carriers and submarines. The ventilation theory section of this course is designed to build on the knowledge gained in the Temporary Ventilation Training course and to learn more about the responsibilities of Temporary Ventilation Foremen.

SHEET METAL WORKER

X32 111 Sheet Metal Print Reading
48 Hours 4.5 Credit

Provides the apprentice with a thorough knowledge of basic print reading and grouping that is essential to the sheet metal trade. This course covers fundamental drawing information, including isometric and orthographic objects, weld symbols, ship terms and abbreviations, scaling, types and parts of drawings, and work packages. Also includes interpreting group sheets and computer bills of material.

X32 112 Materials and Machine Processes Theory
24 Hours 2 Credit

Exposes the apprentice to various sheet metal materials as well as the machinery and processes involved in the fabrication and installation of sheet metal products. This course includes material identification and characteristics along with types of fasteners and pipe sizes. In addition, the course covers basic sheet metal tools and machines, machine processes, shielded metal arc welding, drilling, and tapping operations, with emphasis placed on safe work practices. Prerequisite: X32 111.

X32 113 Sheet Metal Layout Theory
24 hours 2 Credit

Introduces the apprentice to the concepts of planning, designing, and shaping complex sheet metal components using applied math and geometry. This course covers sheet metal and heavy metal layout for breaking, forming, rolling, and notching to form material into three dimensional objects and components. The course includes square breaks, radius breaks, and rolling by hydraulic presses, hand brakes, and hand and power rollers, with an emphasis on safe, efficient work practices. Prerequisite: X32 112.

X32 125 Fundamentals of Sheet Metal
120 Hours 4 Credits

Exposes apprentices to the basics of sheet metal work in a shop environment. Apprentices start by learning the functions and use of basic hand and measurement tools, grinders, and safety procedures. Apprentices learn advanced skills such as the use of sheet metal breaks, rollers, saws, rivets, punches, dies, shears, and sanders. The skill of welding thin metals using different processes is taught. Apprentices will learn proper layout and assembly in accordance with drawings and work documents. Pass or fail.

X32 135 Sheet Metal Shop Work
180 Hours 6 Credits

This practical provides the apprentice with production shop work experience. Apprentices experience the stages of sheet metal fabrication and learn and use breaks, rollers, and shears to fabricate assemblies and then use numerous welding processes to join and finish them. Pass or fail. Prerequisite: X32 125.

X32 137 Ventilation Installation
300 Hours 10 Credits

Provides hands on work experience on surface ships and submarines. Apprentices install and test ventilation equipment including the fit-up of vents, installation of fans and climate control equipment, and grooming systems for completion. This requires working in a team environment in accordance with drawings and procedures. Apprentices will apply knowledge learned in X32 125 in a shipboard production environment. Pass or fail. Prerequisite: X32 125.

X32 139 Equipment Installation
300 Hours 10 Credits

Apprentices work to construct and outfit compartments while using drawings and work documents to meet engineered specifications. The construction requires welding, riveting, layout, measurement, and assembly. Apprentices will learn to work a process from beginning to completion and including inspection. Pass or fail. Prerequisite: X32 125.

SHIPFITTER

X11 111 Hull Construction I
18 Hours 1.5 Credit

Develops a general understanding of safe and efficient shipbuilding manufacturing practices and the tools involved in these practices. Includes hull trade apprentice shipyard safety responsibilities, tools of the trade, ship nomenclature, hull construction, basic ship lines, structural shapes, fractions and plate weight conversions. Also includes, interpretation of drawings, work packages, material layoff, joint fit-up, workmanship, and weld symbols.

X11 112 Hull Construction II CVN Drawings and Work Packages
8 Hours 1 Credit

Develops an understanding of efficient shipbuilding manufacturing practices through detailed drawing and work package interpretation. Includes analysis of carrier construction documents. Prerequisite: X11 111.

X11 113 Hull Construction II VCS Drawings and Work Packages
8 Hours 1 Credit

Develops an understanding of efficient shipbuilding manufacturing practices through detailed drawing and work package interpretation. Includes analysis of submarine construction documents. Prerequisite: X11 111.

X11 137 Shipfitting Practical - Shops
300 Hours 10 Credit

Provides apprentices with practical experience on submarine and surface ship components in shop and platen environments. Apprentices learn safe use of grinding, burning, and welding equipment and are taught to work to drawing and procedure requirements. The apprentice will prep and fit plates and structures into modules for ships by grinding and burning pieces to drawing specifications and then tack welding into place. The apprentice will learn to work at a production-level pace and meet all guidelines. Pass or fail.

X11 138 Shipfitting Practical - Submarines
360 Hours 12 Credit

Provides practical shipfitting experience working on a submarine. While shipboard, apprentices will work on hull structures, foundations, bulkheads, and tanks. Apprentices will learn to work to the applicable drawings and procedures while maintaining a safe environment. The apprentice will weld, grind and fit steel assemblies and structures to the submarine. Also, tanks will be opened and closed and apprentices will perform burning jobs making precise cuts. The apprentice will work as part of a team and will also learn to work with the customer. Pass or fail.

X11 139 Shipfitting Practical – Surface Ships
360 Hours 12 Credit

Provides practical shipfitting experience on a surface ship. While shipboard, apprentices will work on hull structures, foundations, bulkheads, and tanks. Apprentices will learn to work to the applicable drawings and procedures while maintaining a safe environment. The apprentice will weld, grind and fit steel assemblies and structures to the surface ship. Also, foundations for machinery will be set, tanks will be opened and closed, and burning jobs performed requiring precise cuts. Pass or fail.

SUPPLY CHAIN SPECIALIST

X06S 111 Fundamentals of Supply Chain Management
300 Hours 10 Credit

Exposes apprentices to the basics of supply chain management, the procurement process, and compliance and storage requirements for all materials purchased. Apprentices will learn the fundamentals of purchase orders, supplier compliance, federal and state requirements as well as warehousing. Apprentices will be shown the importance of quality of work, attention to detail, and working with suppliers. This experience prepares apprentices to work efficiently on their own and learn procedural requirements. Pass or fail.

X06S 137 Supply Chain Management – Direct Procurement
420 Hours 14 Credit

Provides hands on work experience in direct contract procurement. This on-the-job training teaches apprentices how to read and interpret engineering documents to create different types of documents to send to suppliers such as a Request for Quote (RFQ). Apprentices will learn the importance of good communication and networking skills as they negotiate a fair price for the materials they are purchasing. Apprentices will also get to research for possible new suppliers available to ensure that the proper supplier is being selected. Pass or fail. Prerequisite: X06S 111.

X06S 139 Supply Chain Management – Indirect Procurement
420 Hours 14 Credit

In this practical, apprentices will obtain experience purchasing a variety of equipment for the facilities planning, facilities engineering, and many other departments within the shipyard. This will include having to facilitate meetings or briefs about projects. Apprentices will utilize information and contacts learned in Supply Chain Management Fundamentals to work with warehousing to store and distribute material to job sites. This experience will be high paced and apprentices will learn the importance of time management, organizational skills, and stress management. The importance of team work and attention to detail will be emphasized as apprentices work with high volume purchase orders. Pass or fail. Prerequisite: X06S 111.

WELDER

X11 111 Hull Construction I (See SHIPFITTER)

X18 112 Welding Fundamentals: SMAW and GMAW
18 Hours 1 Credit

Develops a general understanding of safe and efficient welding practices and the tools involved in these practices. Includes shipyard safety, fundamentals of SMAW electrical circuits, terms and definitions, weld symbols, the structural joint numbering system, and proper welding sequence. Consists of an examination of GMAW components and electrical characteristics of the system.

X18 137 Welding - Submarines
510 Hours 17 Credit

Provides practical experience welding in a production environment on submarines and related components. Apprentices will utilize proper procedures to include numbered joints to produce quality welds that will withstand designed stresses. Apprentices will learn to work using submarine drawings and weld maps to include inspecting to ensure proper criteria is met. The weld processes used will

include SMAW, GMAW, FCAW, and GTAW. Apprentices will have to use proper heating sources, set machine parameters, and troubleshoot machine issues. Apprentices will learn to work in a team environment towards a common goal. Pass or fail.

X18 139 Welding – Surface Ships
510 Hours 17 Credit

Provides work experience performing welding operations to support construction on surface ships. Apprentices will weld related components in different stages of construction using hull drawings and proper procedures. Apprentices will use basic weld processes in SMAW, GMAW, GMAW-P, FCAW, and GTAW. Proper weld sequencing will be observed and apprentices will use proper gauges for pre-inspection and preheating techniques. Machine parameters such as gas flow, power supply and wire feed are set in accordance with job standards and procedures. Apprentices will weld multiple joint designs including butt, fillets, corners, and tees. Pass or fail.

X18 212 Introduction to Non Destructive Testing (NDT)
8 Hours 1 Credit

Develops an academic and hands-on understanding of non-destructive weld testing techniques. Includes the most common types of weld discontinuities, the most commonly used NDT methods, and the advantages and limitations of each. The course also includes the interrelationships between welding processes, discontinuities, and inspection methods.

WELDING EQUIPMENT REPAIRER

X31 111 Applied Theory I: DC Concepts (See ELECTRICIAN)
X31 112 Applied Theory II: AC Concepts (See ELECTRICIAN)
X31 212 Applied Theory III: Polyphase Systems and Controls (See ELECTRICIAN)
X31 214 Programmable Logic Controllers (See ELECTRICIAN)

O43W 142 Welding Equipment Repair
360 Hours 12 Credit

In this practical, apprentices receive training in general welding equipment repair and welding power supplies throughout the plant directly servicing production areas. With an emphasis on safety they will utilize acquired qualifications for Lock-out/Tag-out procedures on electrical systems, CPR training, and Low Voltage certifications. They will also apply National Electrical Code as related to welding processes. Welding repair apprentices will troubleshoot and repair a variety of peripheral equipment including wire feeders, a variety of welding power supplies, and a variety of automatic and semi-automatic welding apparatus. Pass or fail.