



# Maritime High School Course Outline

The required courses for College Preparatory High School Diplomas and General Diplomas are set by State Education Departments, and further defined by local school boards. The courses indicated below provide maritime training at the secondary level of education. The training is structured to provide knowledge about the maritime industry as well as demonstrate the career opportunities available to high school graduates within the maritime industry. Graduates can choose to go directly to work for a shipyard or maritime company/union or continue their education by attending a maritime academy, college, or trade school.

Title 46 of the Code of Federal Regulations, Part 310.55, establishes specific criteria in order to attend the U.S. Merchant Marine Academy. The requirements are similar for the state and regional maritime academies. Students planning to attend a maritime academy must complete, at a minimum, 15 units of credit in the following subjects:

<u>Units of Credits</u>	<u>Subject</u>
3	Mathematics (from algebra, geometry and trigonometry)
3	English
1	Physics or Chemistry
8	Preferably chosen from the following fields: <ul style="list-style-type: none"> <li>• Additional mathematics and science;</li> <li>• Foreign language;</li> <li>• Economics; and,</li> <li>• Social science</li> </ul>

## Proposed Sequence for College Preparatory Diplomas

- Grade 9:** English I, Algebra I, World History, Physical Science  
**Introduction to General Maritime Studies**
- Grade 10:** English II, Geometry, Foreign Language I, Chemistry  
**Introduction to Maritime Skills**
- Grade 11:** English III, Biology, Trigonometry/ Algebra II, Foreign Language II  
**Advanced General Maritime Studies**
- Grade 12:** English IV, Introduction to Economics, Pre-Calculus, Physics  
**Maritime Career Preparation**

**Note:** A course curriculum must meet state education requirements. For those not planning to attend a Maritime Academy, the state required courses for a general degree should suffice.





The maritime course outline below is designed to give all students a basic understanding of the Marine Transportation System. In their junior and senior years the students will be required to choose a career path between mariners, shipbuilding and repair, and port operations to ensure they receive specialized training in their desired career. Internships should be incorporated into the junior and senior years where possible.

## Maritime High School Course Outline

### 9<sup>th</sup> Grade

#### Introduction to General Maritime Studies and Careers (All students receive the same training)

**Course Objective:** To introduce students to the maritime industry, its function in U.S. and world history, commerce, basic terminology/nomenclature, and careers. This will allow the students in a very interactive (tours/ guest speakers/class project) manner to look at the industry and to decide if they want to pursue further studies in high school leading to employment or higher maritime education.

**Course Length:** Recommended 45 classroom hours of instruction exclusive of tours, labs and guest speakers.

**Instructional Period Length:** Instruction lessons are set at 1 hour per lesson. This will allow for individual high schools to adapt lessons to fit the course of instruction following either a traditional (7 period day) or block (4 period day) schedule.

**Course Introduction:** Review course requirements; discuss class projects, field trips, guest speakers, homework and grade requirements. Discuss purpose of course and relevance to students in making a decision to pursue a maritime career course of study at the high school.

**Guest Speaker/Tours:** This course will provide an excellent opportunity for the Maritime High School to partner and engage the assistance and support of its local maritime partners thru its local maritime association, marine employers, museums and maritime academic institutions.

### Course Outline

#### 1. Introduction to the Maritime Transportation System (2 hours)

- 1.1 What is the Merchant Marine?
- 1.2 What is the Marine Transportation System?

#### 2. Introduction to Ship and Maritime Terminology (4 hours)

- 2.1 Introduction
- 2.2 Types of Ships purpose and function (categorize by function/type) (objective: identification)
  - (a) LNG/LPG
  - (b) Tankers
  - (c) Container
  - (d) U.S. Naval Ships/submarines
  - (e) Passenger vessels
  - (f) Dry-bulk





- (g) Ro/Ro
- (h) Heavy lift
- (i) Tugboats
- (j) Drill ships/jack-up/column stabilizer
- (k) Offshore supply vessels
- (l) Float-on/float-off
- (m) Push boat
- (n) Ferries
- (o) Research vessels
- (p) Luxury yachts
- (q) Barges
- (r) Fishing vessels
- (s) Coast Guard cutters
- (t) Fire boats

2.3 Ship Nomenclature (General)

2.4 Basic Safety

2.5 Ship Organization

*(Recommend ship or tug tour)*

### **3. Introduction to Marine Engineering and Shipbuilding Terminology (4 hours)**

3.1 Introduction

3.2 Ship construction (Basic)

3.3 Classification of Merchant Ships

3.4 Propulsion overview (Types)

*(Recommend ship or tug tour)*

### **4. Introduction to Shoreside and Seagoing Careers (4 hours)**

4.1 Introduction

4.2 Seagoing Careers (*Guest Speaker Professional Mariner Captain/Chief Engineer*)

4.3 Shoreside Careers (*Guest Speaker Shoreside Professional*)

4.4 Service Profession (*Guest Speaker Maritime/USCG/NOAA/USN/U.S Army Corp*)

### **5. Maritime History (World/US) (8 hours)**

5.1 Introduction

5.2 World History (Origins/Importance of Free Trade)

5.3 Historical Role of U.S. Maritime Industry

5.4 Economic Role of U.S. Shipyards /Shipbuilding

5.5 Economic Role of U.S. Merchant Marine

5.6 National Defense Role of U.S. Merchant Marine

*(Recommend visit to local Maritime Museum of Historic Vessel)*

### **6. Overview of Shipbuilding and Repair Careers (4 hours)**

6.1 Introduction

6.2 New Vessel Construction

6.3 Ship Repair Operations

6.4 Tug Barge Construction

6.5 Recreational Boat Construction/Repair

6.6 Offshore Drilling Industry

6.7 Ship Engineering and Design

*(Recommend visit to Shipyard)*



## **7. Specifics of Port Operation Careers (3 hours)**

- 7.1 Introduction
- 7.2 Understanding Role of Port Operations
- 7.3 Waterfront Operations (Loading/ Unloading Vessels)
- 7.4 Distribution of Cargo (Arrival and Departure from Port)
- 7.5 Homeland/Maritime Security
- 7.6 Marine Logistics (Cargo Distribution)

*(Recommend visit to Port)*

## **8. Specifics of Maritime Support Operations Careers (4 hours)**

- 8.1 Introduction
- 8.2 Ship Agencies
- 8.4 Environmental Agencies/Services
- 8.5 Marine Insurance
- 8.6 Ship Chandlery
- 8.7 Maritime Law
- 8.8 Marine Survey & Classification
- 8.9 Salvage
- 8.10 Docking Assistance
- 8.11 Pilotage Services

*(Recommend 1 or 2 guest speakers or a panel of several to discuss careers)*

## **9. Specifics of Shipping Careers (8 hours)**

- 9.1 Introduction to various areas
- 9.2 Deep Sea
- 9.3 Offshore Supply
- 9.4 Brown Water (Tug/Barge)
- 9.5 Great Lakes
- 9.6 Inter coastal
- 9.7 Recreational (Yachts/Cruise Ships)
- 9.8 Energy Platforms
- 9.9 Government Service (NOAA/MSC/USACE)

## **10. Education Pathways to Maritime Careers (2 hours)**

- 10.1 Introduction
- 10.2 Maritime/Service Academy's
- 10.3 Community Colleges
- 10.4 Professional Institutions
- 10.5 Registered Apprentice Program
- 10.6 Military Service (Coast Guard/Navy/Army)
- 10.7 Company/Labor Programs

## **11. Maritime Career Progression (2 hours)**

- 11.1 Introduction
- 11.2 Unlicensed
- 11.3 Licensed
- 11.4 Shoreside
- 11.5 Government Service





## 10<sup>th</sup> Grade

### Introduction to Maritime Skills (All students receive the same training)

**Course Objective:** To provide students with an understanding of the various occupations in the maritime industry to assist them in identifying their potential career path based on their academic proficiency and interest.

**Course Length:** Recommended 35 classroom hours of instruction exclusive of tours, labs and guest speakers.

**Instructional Period Length:** Instruction lessons are set at 1 hour per lesson this will allow for individual high schools to adapt the lessons to fit their course of instruction following either a traditional or block schedule.

**Course Introduction:** Review course requirements; discuss class projects, field trips, guest speakers, homework and grade requirements. Discuss purpose of course and relevance to students in making a decision to pursue a maritime career course of study at the high school.

### Course Outline

#### Mariner

1. Vessel Familiarization
2. Introduction to Marine Engineering
3. Basic Navigation
4. Basic Shipboard Operations
5. Basic Cargo Handling
6. Health and Safety
7. Computer Applications
8. Quality Assurance

#### Shipbuilding and Repair

1. Use of Hand Tools
2. Components of a Ship
3. Shipyard Trade
4. Shipyard Operations
5. Engineering and Design
6. Health and Safety
7. Materials and Processes of Shipbuilding and Repair
8. Computer Applications
9. Quality Assurance

#### Port Operations

1. Introduction to Safety and Port Operations
2. Introduction to Logistics
3. Health and Safety
4. Computer Applications
5. Quality Assurance



## 11<sup>th</sup> Grade

### Advanced General Maritime Studies

*Students Required to Select a Career Track (Mariner, Shipbuilding & Repair or Port Operations)*

**Course Objective:** To expand students knowledge of a given career path to receive specialized training to develop skills in those areas that can be utilized upon graduation. Students will choose an academic and professional structure, building on the experience and academic curriculum provided.

**Course Length:** Recommended 40 classroom hours of instruction exclusive of tours, labs and guest speakers.

**Instructional Period Length:** Instruction lessons are set at 1 hour per lesson this will allow for individual high schools to adapt the lessons to fit their course of instruction following either a traditional or block schedule.

**Course Introduction:** Review course requirements; discuss class projects, field trips, guest speakers, homework and grade requirements. Discuss purpose of course and relevance to students in making a decision to pursue a maritime career course of study at the high school.

### Course Outline

#### Mariner Career Track

1. Vessel Manning
2. Basic Vessel Maintenance
3. Marlinespike Seamanship
4. Introduction to Safety of Life at Sea
5. Introduction to Academic Maritime Programs
6. Employment Opportunities

#### Shipbuilding & Repair Studies Career Track

1. Introduction to Clusters
  - 1.1 Define Clusters
  - 1.2 Shipyard Safety
  - 1.3 Introduction to Blueprint
2. Engineering/Design Cluster
  - 2.1 Electrician
  - 2.2 Mechanical
    - 2.2(a) Machinery
    - 2.2(b) Piping
  - 2.3 Propulsion
    - 2.3(a) Nuclear Propulsion System
    - 2.3(b) Conventional Propulsion System
  - 2.4 Naval Architect
    - 2.4(a) Design Processes
      - 2.4(a)(1) Modeling and Simulation
      - 2.4(b) Electronic Design Tools





## **2.4(b)(1) Auto CAD/CAM**

- 3. Waterfront Support**  
(Temporary Services/Lifting/Handling)  
(Port Operations)
  - 3.1 Rigging**
    - 3.1(a) Riggers**
  - 3.2 Cranes**
    - 3.2(a) Crane Maintenance/Crane Operators**
  - 3.3 Facilities**
    - 3.3(a) Drydock/Piers**
      - 3.3(a)(i) Dock master**
  - 3.4 Maintenance**
    - 3.4(a) Millwrights**
    - 3.4(b) Electrician/Pipefitter/Equip Repair**
- 4. Hull/Structural**
  - 4.1 Ship Fitter**
    - 4.1(a) Heavy Metal Fabrication**
    - 4.1(b) Modular Construction**
  - 4.2 Sheet metal**
  - 4.3 Welding**
  - 4.4 Non-Destructive Testing**
  - 4.5 Dimensional Control**
- 5. Outfitting**
  - 5.1 Electrical/Electronic**
  - 5.2 Machinery (Marine Machinery Mechanic)**
  - 5.3 Piping/coveeing**
  - 5.4 Module Outfitting**
- 6. Manufacturing**
  - 6.1 Machinist**
  - 6.2 Sheet metal**
  - 6.3 Pipe**
  - 6.4 Foundry Operations (molders & pattern makers)**
  - 6.5 Fabric Workers**
- 7. Project Management**
  - 7.1 Production Planning and Control**
  - 7.2 Capacity Planning**
  - 7.3 Labor Resource Planning (trade matrix)**
  - 7.4 Process Improvement**
    - 7.4(a) Lean**
    - 7.4(b) Six Sigma**
- 8. Cap Stone Set-Up**  
Planning & Selection  
Design (Parameters defined)  
Evaluation/Presentation





## 9. Employment Opportunities

### **Port Operations Career Track**

1. Port Logistics I
  - 1.1 Types of Ports
  - 1.2 Federal Regulations
2. Terminal Operations
  - 2.1 Container Terminal
  - 2.2 Liquid Cargo Terminal
    - 2.2(a) LNG Terminal
    - 2.2(b) Breakbulk Terminal
    - 2.2(c) Drybulk Terminal
3. Intermodal Transportation
4. Employment Opportunities





**12<sup>th</sup> Grade  
Internship for Qualifying Students**

**Maritime Career Preparation**  
(Training dependent on career path – Mariner, Shipbuilding, or Port Operations)

**Course Objective:** Students will receive extensive instruction and experience both academically and practical in the designate career path chosen.

**Course Length:** Recommended 30 classroom hours of instruction exclusive of tours, labs and guest speakers.

**Instructional Period Length:** Instruction lessons are set at 1 hour per lesson this will allow for individual high schools to adapt the lessons to fit their course of instruction following either a traditional or block schedule.

**Course Introduction:** Review course requirements; discuss class projects, field trips, guest speakers, homework and grade requirements. Discuss purpose of course and relevance to students in making a decision to pursue a maritime career course of study at the high school.

## Course Outline

### Mariner Career Track

**1. General**

**1.1** Lifeboatman/Proficiency in Survival Craft

**2. Basic Safety Training\***

**2.1** Personal Safety and Social Responsibilities

**2.2** Basic First Aid/CPR/AED

**2.3** Basic Firefighting Skills

**2.4** Personal Survival Skills

<u>Deck</u>	<u>Engine</u>	<u>Steward</u>
<ul style="list-style-type: none"> <li>• Bridge Resource Management</li> <li>• Navigational Rules</li> <li>• Able Seaman – Introduction (based on 46 CFR 12.12)</li> </ul>	<ul style="list-style-type: none"> <li>• QMED – Introduction (based on 46 CFR 12.15)</li> <li>• Advanced Welding</li> </ul>	<ul style="list-style-type: none"> <li>• Baking and Galley Operations</li> </ul>

\*Basic Safety training is required for all mariners in order to obtain their Standards of Training, Certification, and Watchkeeping (STCW) certificate which is required for mariners sailing on international voyages. In order to obtain credit for this course it must be approved by the U.S. Coast Guard’s National Maritime Center. Training in these areas is extremely valuable to all prospective mariners, even in cases where USCG approval has not been attained, as they are key elements that are recognized by the international community as knowledge a mariner must have to be safe afloat.



### **Advanced Shipbuilding and Repair Career Track**

1. Cap Stone Project(build ship incorporating all clusters)
2. Internship/Co-op
3. Incorporate Organizations
  - 3.1 Society of Naval Architects & Marine Engineering (SNAME)
  - 3.2 ASNE (American Society of Naval Engineering)
4. Basic First Aid/CPR/AED
5. Production Certification

### **Advanced Port Operations Career Track**

1. Basic First Aid/CPR/AED
2. Port Security
3. Seminar in Port, Terminal and Intermodal Freight Topics