

**MARINE SERVICES TECHNICIAN  
(Time-Based)**

**APPENDIX A**

O\*NET CODE 49-3051.00

This training outline is a minimum standard for Work Processes and Related Instruction. Changes in technology and regulations may result in the need for additional on-the-job or classroom training.

**WORK PROCESSES**

	<b>Approximate Hours</b>
<b>A. Safety and Workplace Orientation</b>	<b>150</b>
1. Learn and practice employer-specific safety protocols.	
2. Wear clothing suitable for marine/at-sea environments.	
3. Learn basic seamanship theory and nautical terminology.	
4. Describe preparations for possible maritime emergencies, such as: sinking at sea, recovery of “man” overboard, fire, preparing for rough weather.	
5. Learn visual distress signals, e.g., hand-held flares, signal mirrors, flames, and smoke on deck.	
6. Become familiar with Emergency Position Indicating Radio Beacons (EPIRBs).	
7. Demonstrate Heat Escape Lessening Posture (H.E.L.P.) and describe its role in delaying hypothermia.	
8. Demonstrate donning, maintaining, and storing an immersion Suit.	
9. Describe steps to follow in event of a vessel sinking and abandoning a vessel.	
<b>B. Vessel Technology and Operation</b>	<b>1000</b>
1. Identify and explain basic components of vessel systems: propulsion; steering; fuel; bilge; AC electrical; DC electrical; cooling; heating; hydraulic.	
2. Demonstrate understanding of inspection schedule.	
3. Learn to handle a vessel by understanding maritime theory and fundamentals, such as:	
a. Effect of wind and current;	
b. Propeller design and effect of propeller return;	

- c. Rudder design and function;
  - d. Vessel response to rudder;
  - e. Close quarters turning;
  - f. Dock line identification and handling;
  - g. Landing and getting underway from a pier (with current, too);
  - h. Twin screw theory;
  - i. Steering a compass course.
4. Learn, diagram, and demonstrate elements of towing: astern and alongside.
  5. Write a Float Plan.
  6. Prepare a (mock) medical assistance form.
  7. Know procedure used to facilitate a helicopter evacuation.
  8. Demonstrate procedure for receiving and operating a helo-dropped United States Coast Guard (USCG) dewatering pump.
  9. Diagram typical USCG search patterns.
  10. Learn and employ (when necessary) all manner of meteorologic Concepts, such as: clouds; barometers, weather symbols and maps; National Weather Service (NWS) forecasts; weather events, e.g., thunderstorms, lightning, hurricanes.
  11. Define terms related to a vessel's stability and loss of stability.

### **C. Marina Operations**

**1000**

1. Learn and demonstrate safe working practices around a marina.
2. Wear appropriate wet weather and cold weather gear.
3. Learn procedures used to maximize marina revenue and marina upland storage yard capacity; measure space needed to store a boat using a travel lift.
4. Demonstrate blocking technique for various sizes of vessels.
5. Learn and demonstrate proper hand signals for travel lift and forklift operations.
6. Lift, move, and block a boat using the travel lift, and a forklift.
7. Maintain a floating dock.

8. Tie up vessels of various sizes.
9. Properly maintain marina's buildings, docks, and equipment.
10. Prepare marina for storms.
11. Learn and employ marina security processes.
12. Demonstrate trailer operations, such as: securing a trailer, securing a boat to the trailer, etc.
13. Pressure wash boat bottom(s).
14. Prepare and paint boat bottom(s), using a paint sprayer and wearing Personal Protective Equipment (PPE).
15. Clean, wax, apply and remove compound from boat hull(s).
16. Shrink wrap boats; perform all winterizing activities.
17. Step or un-step a sailboat mast assembly.
18. Write up service orders; use work order program (if applicable).

#### **D. Coastal Piloting and Seamanship**

**1000**

1. Learn to use a mariner's compass.
2. Learn and describe basic navigational aids:
  - a. Buoys: International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) and Uniform State Waterway Marking System (USWMS)
  - b. Lights
  - c. Day beacons
  - d. Primary and secondary seacoast lights
  - e. Fog signals
  - f. Range markers.
3. Learn, describe, and use knowledge regarding tides, such as: tide tables, tidal current tables.
4. Demonstrate use of a Coast Pilot.
5. Use chart catalogues, light lists, and Local Notice(s) to Mariners to aid navigation.
6. Learn to read nautical charts in detail.
7. Learn and employ basic piloting procedures, including course, heading, speed, and distance.
8. Employ dead reckoning to establish vessel location (position).

9. Learn and use all manner of electrical and manual tactics to determine vessel position.
10. Construct and follow a “cruise plan”.
11. Communicate lifesaving procedures and plan to passengers (if applicable).
12. Demonstrate ability to don appropriate Personal Flotation Devices (PFDs).
13. Learn and tie common knots.
14. Describe and demonstrate different anchoring methods.
15. Handle a small boat.
16. Learn and use Convention on the International Regulations for Preventing Collisions at Sea (COLREGS) for both inland and inter-national vessel traffic.

#### **E. Vessel Propulsion Systems**

**1000**

1. Learn principles of internal combustion gasoline engines and diesel engines.
2. Identify engine components.
3. Differentiate between four-stroke and two-stroke principles and operation.
4. Learn principles and components of starting systems, ignition systems, fuel systems, and propeller performance.
5. Diagnose and troubleshoot propulsion system issues utilizing Hand tools, including but not limited to: wrenches, mechanics’ tools, torque wrenches, computerized testers, and engine-specific “special tools”.

#### **F. Marine Electrical Systems**

**1000**

1. Learn basic electrical theory, including current, circuits, and marine batteries.
2. Learn American Boat and Yacht Council (ABYC) specifications and USCG rules regarding marine wiring.
3. Use various electricians’ tools, such as: pliers, crimpers, strippers, multimeters, etc., to make connections, repairs, and troubleshoot electrical issues.
4. Work on various electrical components on vessel(s), e.g., lights, bilge pump, bilge ventilator.
5. Work on marine engine and engine mounted electrical components.

6. Learn gauge terminology, gauge functions, and troubleshoot gauges.

**G. Marine Electronics** **1000**

1. Become familiar with various marine electronic components, including but not limited to: VHF/FM radiotelephones, Single Sideband Radios (SSBs), radar, Global Positioning Systems (GPS), and EPIRBs.
2. Operate and troubleshoot electronic components.
3. Learn, use, and reference National Marine Electronics Association (NMEA) Standards while working with vessel electronics.

**H. Other Vessel Repairs** **1000**

1. Use plumber and pipefitter tools and skills to perform pipe and tubing work commonly found on boats.
2. Use various hand tools, such as saws, sanders, grinders, to make repairs to fiberglass hulls.
3. Learn components of vessel hydraulic system(s); troubleshoot and perform repairs.
4. Learn components of refrigeration system(s); perform diagnostic testing and troubleshoot system(s).

**I. Welding** **1000**

1. Learn metal components of vessel hulls.
2. Wear appropriate welding-specific PPE.
3. Set up and operate oxy-acetylene welding equipment: prepare joints, braze, weld joints, cut steel plate(s).
4. Set up, operate, and test welds performed using Shielded Metal Arc Welding (SMAW or “stick”); Gas Metal Arc Welding (GMAW or “MIG”); Gas Tungsten Arc Welding (GTAW or “TIG”).

**J. Miscellaneous Advanced Service Techniques (\*Optional)** **1000**

1. Build upon knowledge of following systems while troubleshooting domestic water and sanitation plumbing; engine cooling systems; fuel systems tanks; delivery and external filtering systems, AC power generators and distribution, steering systems, and advanced data and power distribution networks.

**Approximate Total Hours** **8000**

\*If Optional Work Processes are not selected, the hours should be devoted to further mastery of required Work Processes.

*Apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law. For guidance regarding classification for purposes of Article 8 or 9 of the Labor Law, please refer to <https://dol.ny.gov/public-work-and-prevailing-wage>.*

# MARINE SERVICES TECHNICIAN

## APPENDIX B

### RELATED INSTRUCTION

#### **Safety, Health, and the Workplace**

1. General Workplace Safety and Emergency Procedures
2. First Aid & CPR (minimum 6.5 hours)
3. Proper Use of Personal Protective Equipment (PPE):  
Marine environments, Spray Painting, Welding
4. Maritime Emergency Procedures
5. Right-to-Know/Safety Data Sheets (SDS)
6. Proper Lifting Techniques
7. Sexual Harassment Prevention – must comply with section 201-g of the Labor Law

#### **Trade Theory, Science, and Skills**

1. Mathematics
2. Computer Applications
3. Blueprint Reading
4. Oceanography
5. Nautical Terms and Theory
6. Vessel Technology and Operation
7. Marina Operations
8. Coastal Piloting and Seamanship
9. Trade-specific reference material and paperwork, e.g.,  
Float Plan, Coast Pilot
10. Forklift/Travel Lift Operation and Rigging Techniques
11. Outboard Motors/Inboard Motors
12. Diesel Engines
13. Basic Electrical Theory
14. Low Voltage Electrical Systems
15. Marine Electronics
16. Fiberglass Repair
17. Hydraulic Repair
18. Vessel Plumbing and Piping

19. Welding

20. USCG rules, USWMS and IALA-B rules, COLREGS, NMEA Standards, etc.

**Additional Courses as Necessary**

A minimum of 144 hours of Related Instruction are required for each Apprentice for each year.

Appendix B topics are approved by New York State Education Department.