



The Marine Center
1701 East Front Street
Traverse City, MI 49686-3061
P (231) 995-2500
marinecenter@nmc.edu

Fundamentals of Marine Technology

Level 1

Course Overview

Fundamentals of Marine Technology focuses on the basic understanding of systems, applications, troubleshooting, calibration and safety requirements specific to marine technology and marine environments.

Objectives

Participants will conduct electrical measurements and diagnostics using multimeters and oscilloscopes and will demonstrate competencies for introductory analysis, construction and troubleshooting techniques for DC and AC circuits including marine batteries and battery charging systems. Emphasis is placed on basic design, repair and integration of cabling, tether, communication devices, sensors, and components into marine technology systems. Participants will use test equipment and protocols to develop troubleshooting methods to analyze and integrate this technology. Additionally, a basic overview of fiber optics and fiber troubleshooting will be demonstrated including fiber splicing. Safe electrical practices will be emphasized.

Marine Fluid Power:

- Focus on basic systems, applications, and safety requirements specific to the marine environments. Participants will build, test, repair hydraulic hoses and components associated with common shipboard applications. Participants will use test equipment and protocols to develop trouble-shooting methods to analyze and integrate this technology.

Marine Sonar & Acoustics:

- Provides a foundation for the use of acoustics in the marine environment while focusing on best practices for underwater search, survey and visualization programs. Multiple sonar systems that are representative of current industry equipment, operations and practices will be emphasized. Participants will gain an understanding of field applications where sonar platform, water depth, temperature, target range, size, acoustic frequency, and object reflectivity/absorption have an effect on target detection, resolution and data accuracy.

ROV:

- The ROV training will introduce the technology of remotely operated vehicles (ROV) as a system used for subsea activities including scientific study and research, subsea exploration and industrial applications. Components of competencies gained in the Fundamentals of Marine Technology will be demonstrated using multiple ROV systems and sensors

Training Program Outcomes

At the end of the training, participants will be able to:

1. Apply the knowledge, techniques, skills, and modern tools of the discipline to broadly defined marine technology activities.
2. Conduct standard tests and measurements and identify troubleshooting techniques for operations and repair of marine technology systems.
3. Acquire a basic understanding of how to properly mobilize, calibrate and troubleshoot marine sonar systems.
4. Acquire a basic understanding of how to integrate and troubleshoot sensor systems to Remotely Operated Vehicles (ROV).

Schedule of Activities

Participants will arrive Monday at 1200 at NMC Parsons-Stulen Campus.

A one hour lunch break will be given Tuesday – Friday.

January 21, 2019 – January 25, 2019

Monday	1200 – 1730
Tuesday	0830 – 1730
Wednesday	0830 - 1730
Thursday	0830 – 1800
Friday	0830 – 1430

Travel and Logistics

time

	Traverse City offers many hotel options during this frame. Please refer to two options below:	
<u>Best Western Plus</u>		<u>Travel Lodge</u>
(231) 946 – 8424		(231) 922 – 9111
\$84/Night		\$45/Night
King-sized bed		King-sized bed
Full breakfast available		Continental breakfast available
Located 1.5 miles from NMC		Located 0.75 miles from NMC



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Proposed Services

Training:	Fundamentals of Marine Technology - Level 1
Scope of Service:	5 day course – 35 hours instruction <u>Course content:</u> (see attached curriculum) <ul style="list-style-type: none">• Marine electronics and electrical systems• Marine fluid power• Marine sonar and acoustics• ROV training
Cost:	\$1,450 per person
Number of Participants:	16 max.
Dates:	January 21, 2019 – January 25, 2019
Location:	Northwestern Michigan College Parsons-Stulen Building 2600 Aero Park Drive Traverse City, Michigan 49686
Terms:	<ol style="list-style-type: none">1. Payment must be received by January 7, 20192. Program cost <u>excludes</u> all travel, lodging, transportation and meals.3. NMC accepts checks and credit cards – Please contact The Marine Center by phone or email for payment options and details.

Fundamentals of Marine Technology Course Curriculum

- I. Electronics and Electrical Systems (13 Hours)
 - a. Diagnostic tools
 - i. Digital volt meter
 - ii. Oscilloscope
 - iii. Megger
 - iv. Power supplies
 - b. Soldering and cable splicing
 - i. Basic circuit design
 - ii. Connector repair and splicing
 - c. Batteries and battery charging systems
 - d. Fiber optics and software/hardware interfaces
 - e. Diagnostic tools
 - i. OTDR
 - ii. Power meters
 - iii. Fusion splice

- II. Marine Fluid Power (8 Hours)
 - a. Hydraulic hose building and testing
 - b. Hydraulic circuit design
 - c. Hydraulic systems troubleshooting

- III. Marine Sonar and Acoustics (10 Hours)
 - a. Basic sonar theory
 - i. Sonar equation
 - ii. Speed of sound
 - b. Sonar calibration
 - i. Patch test
 - ii. Motion Reference Unit
 - iii. Offsets
 - c. Sonar systems and operations
 - i. Scanning
 - ii. Side Scan
 - iii. Multibeam
 - iv. USBL

- IV. ROV (4 Hours)
 - a. ROV systems and operations



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- b. ROV – Sonar/sensor integrations
- c. Software communication protocol
- d. Tether repair and troubleshooting