

MARINE TECHNOLOGY (MT)

MT 105 Introduction to Marine Technology

2 Class Hours, 2 Quarter Credit Hours

Students will be introduced to the operation of the marine lab and program, potential job opportunities and the working environments of Marine Technology. Students will become familiar with the tools used in the repair of marine vessels and safety practices to be used. Students will also practice information retrieval as well as record-keeping. Topics covered are safety in the lab, measuring tools, service manuals, computerized information retrieval, tool identification and use, and fastener identification and uses. Students will also be asked to demonstrate proficiency using appropriate shop equipment.

MT 116 Introduction to Engine Theory

3 Class Hours, 3 Quarter Credit Hours

This course is the study of two- and four-cycle internal combustion engine operation and design. This course will cover inboard, outboard, and diesel engine design. Topics covered are: engine identification, internal components, cooling systems, lubrication systems, and preliminary diagnosis of internal noises, and excessive smoke. The course will also cover basic maintenance practices, as well as major and minor component replacement.

MT 117 Introduction to Engine Lab

4 Lab Hours, 1 Quarter Credit Hours

Students will practice compression and vacuum testing, oil pressure, cooling system examination, and engine noise analysis. Students will learn to identify different engine configurations through the use of VIN or model numbers and will practice finding specifications in service manuals or by using computerized information systems. Students will practice basic maintenance procedures as well as component replacement.

MT 118 Introduction to Electricity Fundamentals

3 Class Hours, 3 Quarter Credit Hours

This course covers electrical fundamentals from "What is electricity?" to basic troubleshooting techniques. Topics covered will be: how electricity is produced, types of electricity, Ohm's Law, basic circuit construction, conductors, insulators, induction, electrical testing tools, and diagnosis of circuit problems.

MT 119 Introduction to Electricity Fundamentals Lab

4 Lab Hours, 1 Quarter Credit Hours

In the lab, students will learn the use of multimeters and other test equipment to diagnose and repair electrical circuits and components including lights, gauges, solenoids, relays, voltage regulators, motors, and generators. Students will be instructed in the correct methods of constructing circuits for both the marine and recreational environment.

MT 120 Advanced Marine Electricity and Electronics Installation

4 Class Hours, 6 Lab Hours, 7 Quarter Credit Hours

Prerequisites: MT 118 and MT 119

This course prepares students to both install and troubleshoot marine-specific electrical systems. Topics studied and lab exercises include USCG and ABYC standards, wire designs, corrosion factors, AC/DC circuit panels, battery switches and isolators, inverters, RFI suppressors, multi-wire systems, lighting, electric pumps, amperage, and power requirements. Lab work will expose students to many forms of marine electronic equipment including: VHF radios, depth finders, GPS, and RADAR. Students will also learn how to interface and install today's marine navigation and communications equipment. Lab exercises will include wire and cable installations, antenna designs, RFI suppression, and the limitations of the NMEA 0183 standard.

MT 127 Marine Engine Applications

2 Class Hours, 2 Lab Hours, 3 Quarter Credit Hours

Prerequisites: MT 116 and MT 117

Four-stroke gasoline engine designs, nomenclature, maintenance, and diagnostics will prepare students for future courses. Students will perform inspection and service procedures to ignition, fuel, cooling, exhaust, and internal engine systems specific to marine applications.

MT 138 Outboard Engine Overhaul and Systems Diagnosis

4 Class Hours, 8 Lab Hours, 8 Quarter Credit Hours

Prerequisites: (MT 116 and MT 117) and (MT 118 and MT 119)

Routine outboard maintenance and repair problems associated with one- and two-cylinder outboard engines will be the focus of this course. Lectures will cover two- and four-cycle theory, basic troubleshooting procedures, synchronization procedures, seasonal maintenance, and winterizing. Students will perform extensive diagnostic work on various engine systems, with emphasis on in-line and "V" configuration engines. Students will perform routine maintenance procedures and become proficient with the use of reconditioning procedures on internal engine components and return their engines to factory running specifications.

MT 215 Fuel Systems Theory and Introduction to EFI Applications

4 Class Hours, 4 Lab Hours, 5 Quarter Credit Hours

Prerequisites: MT 116 and MT 117 and MT 118 and MT 119 and MT 120 and MT 127

Students are introduced to carburetor theory of operation, CFM requirements, mechanical fuel pumps, electric fuel pumps, fuel injection systems, and their related components. Topics covered will include throttle bodies, multi-port injection systems, direct fuel injection, pressure regulators, electronic sensors, and controls. Students will practice fuel tank removal and replacement of fuel pumps, fuel system troubleshooting, and injection cleaning. Students will remove, rebuild, reinstall, and adjust traditional carburetors as well as diagnose and repair TBI, MPFI, and DFI fuel injection systems. Lessons will also cover all USCG, ABYC regulations and standards for fuel tanks, lines, filters, pumps, and installations.

MT 216 Marine Drive Systems Theory and Service

4 Class Hours, 4 Lab Hours, 5 Quarter Credit Hours

Students will work with a variety of inboard engine reverse gear assemblies and drive systems. Students will gain experience with removal, testing, rebuilding, and diagnosis of sterndrive and inboard assemblies. Lessons and lab work include pressure and vacuum testing, disassembly procedures, internal component cleaning, inspection, and evaluation. Students will set gear height, lash, and bearing pre-load and rolling torque to factory specifications. Typical "two-shaft" and planetary gear assemblies will be disassembled, inspected, and reassembled to factory specifications. Both manual and hydraulic shift controls will be discussed and studied as part of the lab experience. Shafts, cutlass bearings, and shaft sealing methods and procedures will be covered at length, and students will practice routine service to these systems as part of the lab experience.

MT 217 Diesel Engine Service and Maintenance

2 Class Hours, 6 Lab Hours, 4 Quarter Credit Hours

Prerequisites: MT 116 and MT 117 and MT 118 and MT 119 and MT 120 and MT 127

This course introduces students to the operating principle of diesel engines. Course studies will include: two- and four-cycle engines, combustion chamber designs, low- and high-pressure fuel delivery systems, cold start aids, supercharging, intake/exhaust requirements, engine diagnostics, and re-powering considerations. Students will gain experience in lab by performing maintenance and engine performance troubleshooting on a variety of popular engine designs.

MT 218 Marine Systems

2 Class Hours, 2 Lab Hours, 3 Quarter Credit Hours

Common systems of both marine and recreational vehicles will be designed and installed by students. System components include water and MSD tanks, manual and electric pumps, AC/DC lighting fixtures, electric, alcohol, LPG, and CNG appliances. Students will learn proper service and installation procedures with emphasis on all applicable industry safety codes and standards.

MT 254 Marina and Boatyard Management

3 Class Hours, 3 Quarter Credit Hours

Students will learn the practices and procedures necessary to successfully operate a marine business. The course will cover the special circumstances specific to a marine business such as insurance considerations, environmental control, and storm preparation considerations. The course will follow the guidelines and recommendations found in the ABBRA (American Boatbuilders and Repairers Association) Boatyard & Marina Operator's Manual.

MT 255 Marine Industry Internship

4 Quarter Credit Hours, 20

Prerequisites: MT 105 and MT 116 and MT 117 and MT 118 and MT 119 and MT 120 and MT 127 and MT 138 and MT 215 and MT 216 and MT 217 and MT 218 and MT 261 and MT 263 and MT 258 and WEL 110 and WEL 151 and AUB 260

Students will work off-site at an approved marine related business. These businesses will be selected based upon their suitability to provide a valuable learning experience for students in a variety of related specialty areas within the industry. Student progress will be monitored weekly by the Marine Technology Department to ensure compliance with experiential learning criteria established by the department.

MT 258 Elements of Marine Surveying

1 Class Hours, 3 Lab Hours, 2 Quarter Credit Hours

Prerequisites: MT 120 and MT 127 and MT 138 and MT 217 and MT 218 and MT 215 and MT 216

Corequisites: MT 215, MT 216

This course covers the details of the marine survey for both sail and power small craft. Students will learn what to look for in evaluating a boat for pre-purchase and valuation as required by financial institutions and insurance companies. Students will learn the procedures for both invasive and non-invasive methods of determining hull and deck integrity; electrical, mechanical, and systems integrity; and compliance with accepted standards and regulations. Design and completion of the survey form will be covered and practiced by students. Students will be introduced to the codes and standards of both SAMS (Society of Marine Surveyors) and NAMS (National Association of Marine Surveyors). USCG regulations will be covered at length.

MT 261 Fiberglass Fabrication and Repair

2 Class Hours, 2 Lab Hours, 3 Quarter Credit Hours

This is an introductory course teaching the essentials for fabricating and repairing damaged composite laminates. Students will work with polyester, vinylester, and epoxy resins, and a variety of fiberglass cloth materials to learn proper mixing and lay-up procedures for making effective repairs and new parts. Curing considerations and special procedures required when working with cored laminates and resin infused/vacuum-bagged laminates will be discussed and practiced by students.

MT 262 Advanced Composites and Fabrication

2 Class Hours, 2 Lab Hours, 3 Quarter Credit Hours

Prerequisites: MT 261

This advanced course teaches the essentials of fabricating plugs (male molds), female molds, and repairing complex damaged composite laminates. Students will learn the complexity of building plugs and molds with wood, resins, and fiberglass fabric materials. Students will also study curing considerations and special procedures required when making molds. Vacuum-bagging and "Splash" laminates will be discussed.

MT 263 Forklift Safety & Operations

2 Lab Hours, 1 Quarter Credit Hours

Students in this course will gain the knowledge and experience necessary for safe operation of a powered industrial truck used in the marina environment. Powered industrial trucks are any mobile power-propelled truck used to carry, push, pull lift, stack or tier material. Maritime standards for powered truck operation are identical to those in the CFR1910:178 and OSHA requirements for warehouses, lumberyards, etc. which require training and certification. Students in this course will gain a full understanding of the methods and procedures necessary to safely operate a powered industrial truck in the marine workplace environment. Each class will consist of a mixture of presentations, related material handouts, dialogue between instructor and students, and hands-on demonstration. Students will practice pre-inspection and operation of various powered industrial trucks as well as ABYC requirements for blocking and securing vessels in the yard. At the completion of this course, the successful student will receive OSHA required certification to operate a powered industrial truck.

MT 272 Advanced Marine Diesel Service and Maintenance

2 Class Hours, 6 Lab Hours, 5 Quarter Credit Hours

This course will focus on advanced diesel engine components including: electronically-controlled pumps, injectors, sensors, as well as cabling and diagnostics of engine computer hardware, and software. Fuel system service procedures will include common rail and overhead cam electronic unit injection (EUI). Labs will include EUI engine cylinder head service, diagnostics and fuel component service/replacement procedures. Students will perform hands-on installations of CAN Buss network systems and learn the function of electronic control systems commonly found on diesel engines and marine driveline components.

MT 276 Advanced Marine Propulsion Systems

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

This course will focus on electronically-controlled propulsion systems and the mechanical propulsion components and their electronically-controlled systems. Service and Maintenance procedures for both Volvo Penta IPS and DPH stern drives will be concentrated on during this course. The course will be lab intensive, with an emphasis on installation, maintenance and rebuilding procedures for both of these propulsion systems. Students will become proficient in drive seal replacement, clutch replacement, and rebuilding procedures for these marine drive systems. Students will also learn the function of electronic control systems for these drives, to include IPS and joystick-controlled stern drive systems.

MT 277 Advanced Marine Gasoline EFI and Emissions

2 Class Hours, 2 Lab Hours, 3 Quarter Credit Hours

This course will focus on marine gasoline EFI engines which have EPA mandated emission control systems. Students will perform replacement procedures of emission components, advanced engine management diagnostics, and be able to explain the function of emission controls for marine inboard and stern drive gasoline engines. Lesson and lab exercises will include: testing procedures of narrow and wide band oxygen sensors, Alarm and engine de-rate fault tracing, short- and long-term fuel trim management comparison graphing, and cylinder miss-fire detection and diagnostics. Students will learn to perform PC-based diagnostic recordings and graphing analysis on engine emission systems. Students will also work with a variety of special diagnostic tools which will enhance their ability to properly diagnose emission related faults and engine performance issues.