Maryland CTE Programs of Study

Marine Maintenance and Repair IV (2025)

GENERAL REQUIREMENTS. This course is recommended for students in Grades 11-12. 1

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INTRODUCTION 2

A Career and Technical Education (CTE) instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions. 2.A

B The Supply Chain & Transportation Career Cluster encompasses the transfer, coordination, and management of goods from production to consumption, ensuring efficient movement across various modes of transportation including air, ground, and water, as well as maintenance of the respective transport modes. This Cluster integrates logistics and distribution networks to facilitate the seamless flow of materials and products, playing a crucial role in global commerce, economic development, and community health. 2.B

C The Marine Maintenance and Repair program is a comprehensive four course sequence that prepares students for careers in marine service and boat building. Through hands-on experience with industry-standard tools and equipment, students develop essential skills in boat construction, electrical systems installation, engine and propulsion system service, and advanced marine system repair. The program integrates fundamental construction techniques with complex systems integration, teaching students to build, maintain, and repair modern vessels aligned to American Boat and Yacht Council standards. Students learn to work with diverse materials including composites, marine-grade woods, and metals while mastering electrical system design, engine installation, and advanced diagnostics. Upon completion, graduates are prepared for entry-level positions in marine service, boat building, or yacht repair facilities, and are equipped with the knowledge needed to successfully complete the ABYC Marine Service Technician Certification examination. 2.C

D The Marine Maintenance and Repair IV course develops advanced troubleshooting and repair skills across all marine systems. Students learn complex diagnostic procedures for electrical and electronic systems while developing expertise in structural and system repairs. The course covers advanced composite repair

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techniques, marine woodworking restoration, and metal fabrication for repairs. Students gain experience in system upgrades, electronic equipment installation, and complex problem-solving while maintaining detailed documentation of all repair procedures. 2.D

E **Students will participate in at least two Career-Connected Education and Work-Based Learning experiences in this course, which might include informational interviews or job shadowing relevant to the program of study.** 2.E

F **Students are encouraged to participate in extended learning experiences through aligned Career and Technical Student Organizations (CTSOs). CTSOs are a cocurricular requirement in the Carl D. Perkins Act, and alignment to CTSO activities is an expectation for CTE programs in the state of Maryland.** 2.F

KNOWLEDGE AND SKILLS 3

A **The student demonstrates the necessary skills for career development, maintenance of employability, and successful completion of course outcomes. The student is expected to:** 3.A

1. Identify and demonstrate positive work behaviors that enhance employability and job advancement, such as regular attendance, promptness, proper attire, maintenance of a clean and safe work environment, and pride in work. 3.A.1
2. Demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, active listening, and a willingness to learn. 3.A.2
3. Employ effective reading, writing, and technical documentation skills. 3.A.3
4. Solve problems using critical thinking techniques and structured troubleshooting methodologies. 3.A.4
5. Demonstrate leadership skills and collaborate effectively as a team member. 3.A.5
6. Implement safety procedures, including proper handling of hardware and following OSHA guidelines. 3.A.6
7. Exhibit an understanding of legal and ethical responsibilities in the Marine Maintenance and Repair field, following applicable laws and best practices for safety. 3.A.7
8. Demonstrate time-management skills and the ability to prioritize tasks in a technical setting. 3.A.8

B **The student identifies various career pathways in the Marine Maintenance and Repair field. The student is expected to:** 3.B

1. Develop a career plan that includes the necessary education, certifications, job skills, and experience for specific roles as a technician or in the Marine Maintenance and Repair field. 3.B.1
2. Create a professional resume and portfolio that reflects skills, projects, certifications, and recommendations. 3.B.2
3. Demonstrate effective interview skills for roles in the Marine Maintenance and Repair field. 3.B.3

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C **The student identifies the issues associated with Marine Maintenance and Repair hazards found on a jobsite. The student is expected to:** 3.C

1. Demonstrate safe working procedures in a lab/shop environment. 3.C.1
2. Explain the purpose of the Occupational Safety and Health Administration (OSHA) and how it promotes safety on the job. 3.C.2
3. Identify Marine Maintenance and Repair related workplace hazards and how to avoid or minimize them. 3.C.3
4. Explain safety issues concerning lockout and tagout procedures, personal protection using assured grounding and isolation programs, automotive lift safety, and other equipment related safety protocols. 3.C.4

D **The student integrates core academic skills into Marine Maintenance and Repair practices. The student is expected to:** 3.D

1. Demonstrate the use of clear communication techniques, both written and verbal, that are consistent with industry standards. 3.D.1
2. Analyze complex electrical measurements using advanced mathematical principles, calculate load requirements across integrated systems, and apply statistical analysis to diagnostic data. 3.D.2
3. Understand principles of electronic signal transmission, analyze wave propagation in marine electronics, comprehend chemical processes in advanced materials repair, and apply concepts of structural mechanics in repair procedures. 3.D.3

E **The student performs advanced electrical diagnostics. The student is expected to:** 3.E

1. Execute complex electrical troubleshooting procedures by using advanced diagnostic equipment, interpreting test results, and documenting findings systematically. 3.E.1
2. Diagnose integrated system problems by analyzing multiple system interactions, using logical troubleshooting sequences, and isolating faults accurately. 3.E.2
3. Perform advanced electrical testing by using oscilloscopes and specialized test equipment, interpreting complex waveforms, and documenting results properly. 3.E.3
4. Implement electrical system repairs by following manufacturer procedures, using appropriate repair methods, and testing systems thoroughly after repairs. 3.E.4
5. Document diagnostic procedures by maintaining detailed repair records, creating clear client reports, and recommending preventive measures. 3.E.5

F **The student demonstrates advanced repair techniques. The student is expected to:** 3.F

1. Perform structural damage assessment by using appropriate inspection techniques, documenting findings with photos and measurements, and developing detailed repair plans. 3.F.1

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2 Execute complex composite repairs by matching materials properly, following correct layup sequences, and achieving structural integrity and cosmetic quality. 3.F.2

3 Implement marine woodworking repairs by selecting appropriate materials, using proper restoration techniques, and maintaining original strength and appearance. 3.F.3

4 Perform metal component repairs by selecting appropriate repair methods, executing proper welding or fabrication techniques, and ensuring structural integrity. 3.F.4

5 Apply proper finishing techniques by preparing surfaces correctly, using appropriate marine finishes, and achieving professional-quality results. 3.F.5

G The student executes marine electronics procedures. The student is expected to: 3.G

1 Install marine electronic systems by following manufacturer specifications, ensuring proper mounting and connections, and maintaining appropriate clearances. 3.G.1

2 Perform system integration procedures by connecting multiple devices, configuring network settings, and ensuring proper communication between systems. 3.G.2

3 Execute proper calibration procedures by following manufacturer protocols, adjusting settings accurately, and documenting final configurations. 3.G.3

4 Implement testing protocols by conducting systematic function checks, verifying proper operation, and documenting all test results. 3.G.4

5 Demonstrate proper documentation procedures by creating detailed installation records, maintaining calibration logs, and preparing client operation guides. 3.G.5

H The student performs complex system repairs. The student is expected to: 3.H

1 Diagnose complex system failures by using advanced diagnostic equipment, creating detailed fault trees, and systematically analyzing multiple system interactions to identify root causes. 3.H.1

2 Execute advanced troubleshooting procedures by implementing manufacturer diagnostic protocols, interpreting complex error codes, and using logical problem-solving methodologies to isolate faults. 3.H.2

3 Implement system repair procedures by selecting appropriate repair methods, following manufacturer specifications, and ensuring repairs restore system to original functionality while maintaining vessel integrity. 3.H.3

4 Perform system upgrades by evaluating compatibility requirements, planning integration with existing systems, and implementing updates according to manufacturer specifications while maintaining proper documentation. 3.H.4

5 Document repair procedures by creating detailed repair reports with photos, maintaining service records, and providing customers with comprehensive documentation including preventive maintenance recommendations. 3.H.5