Maryland CTE Programs of Study

Renewable Energy III (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 Career Cluster focuses on preparing students for foundational careers in environment, agriculture and natural resource management, renewable energy production, and forester & natural-resource conservation and wastewater & water quality. This cluster emphasizes the essential skills needed for careers in energy production, environmental conservation, sustainability management, and geospatial technology. Professionals in this field operate in diverse settings, including renewable energy facilities, environmental research labs, and conservation organizations. 2.B

C The Renewable Energy Program of Study (POS) offers students foundational knowledge in environmental systems, renewable resources, and sustainability practices. Students will gain hands-on experience through structured coursework and practical applications, enabling them to explore the essential functions of environmental science and sustainability engineering careers. 2.C

D Renewable Energy III builds on prior coursework by advancing students' expertise in ecosystem dynamics, cutting-edge renewable energy systems, and innovative resource management strategies. This course focuses on solving complex, real-world environmental challenges such as reducing carbon emissions, protecting endangered species, and integrating renewable energy into existing infrastructures. Students will critically evaluate case studies of global sustainability efforts, refine their understanding of ethical and legal responsibilities in environmental practices, and design forward-thinking solutions for conservation and energy efficiency. Through hands-on projects and advanced technical training, this course prepares students to lead initiatives in sustainable development and environmental stewardship. 2.D

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Students will participate in at least two Career-Connected Education and Work-Based Learning experiences in this course, such as attending guest lectures from

environmental scientists, field visits to renewable energy facilities, or participation in local conservation projects. 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 advanced skills in environmental science, renewable energy, and sustainability practices. The student is expected to:** 3.A

1. Analyze ecosystem dynamics and interpret environmental data to address sustainability challenges, such as biodiversity conservation, water quality, and pollution mitigation. 3.A.1
2. Perform advanced renewable energy tasks, including designing, simulating, and optimizing solar, wind, and hydroelectric energy systems using industry-standard tools and software. 3.A.2
3. Operate environmental monitoring equipment and geospatial tools in both simulated and real-world scenarios to collect, analyze, and interpret environmental data for resource management and conservation efforts. 3.A.3
4. Demonstrate knowledge of renewable energy systems, maintenance practices, and troubleshooting procedures for technologies such as photovoltaic panels, wind turbines, and energy storage systems. 3.A.4

B **The student identifies career pathways. The student is expected to:** 3.B

1. Design a career plan that includes a clear pathway for advancement within environmental science, renewable energy, and sustainability engineering fields, highlighting opportunities for continuous education, industry certifications, and specialization roles. 3.B.1
2. Develop a career plan that outlines the necessary education, certifications, job skills, and experience for roles in environmental and energy industries. This plan may include certifications like GIS, LEED, or Solar System Installation, as well as hands-on experience through internships or work-based learning opportunities. 3.B.2
3. Demonstrate effective interview skills for roles in environmental science, renewable energy, or sustainability, with a focus on entry-level positions. These skills include articulating technical knowledge, showcasing work-based learning experiences, and understanding the expectations of industry professionals. 3.B.3

C **The student develops technology and digital literacy skills. The student is expected to:** 3.C

1. Use technology as a tool for environmental data collection, renewable energy modeling, and geospatial analysis. This includes leveraging tools to simulate energy efficiency, track resource usage, and monitor ecosystem changes. 3.C.1

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2 Apply digital tools for creating and managing technical reports, resource management plans, and project presentations. Students will use platforms such as spreadsheet software for data analysis, presentation software for communication, and cloud-based tools for collaboration. 3.C.2

3 Demonstrate proficiency in using industry-standard software, including GIS mapping tools, renewable energy design platforms, and environmental impact assessment tools. This includes creating geospatial maps, analyzing renewable energy potential, and modeling sustainable systems. 3.C.3

4 Adhere to ethical and legal considerations for technology use, including environmental regulations, secure data management, and intellectual property laws. Students will demonstrate responsible practices in using data and tools for environmental projects. 3.C.4

D The student integrates core academic skills. 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 in environmental science, renewable energy, and sustainability practices. This includes presenting findings, collaborating on conservation projects, and delivering technical information effectively to various audiences. 3.D.1

2 Apply English concepts such as writing technical reports, documenting sustainability projects, and articulating resource management plans and environmental goals. This includes creating well-structured, professional documents that align with industry expectations. 3.D.2

3 Apply scientific principles relevant to environmental science and renewable energy, including ecosystems dynamics, energy transfer, and the physical properties of renewable systems (e.g., solar panels, wind turbines, and hydropower). Students will also explore principles of chemistry and biology as they relate to pollution control, soil health, and biodiversity. 3.D.3

4 Recognize the roles and responsibilities of government agencies, environmental regulations, and public policies that impact sustainability and resource management. This includes knowledge of environmental laws, ethical considerations, and regulatory compliance in areas such as water quality, emissions standards, and energy use. 3.D.4

5 Utilize mathematical skills, including measurement, ratios, and data interpretation, for renewable energy calculations, resource allocation, and data analysis. Students will calculate energy efficiency, interpret graphs of environmental trends, and evaluate the economic viability of sustainable solutions 3.D.5

E The student demonstrates knowledge and skills for environmental science and sustainability scenarios. The student is expected to: 3.E

1 Understand and implement safety protocols to minimize risks during environmental fieldwork, renewable energy installations, and laboratory operations. This includes identifying potential hazards, ensuring proper site assessments, and maintaining safety during conservation and sustainability projects. 3.E.1

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2 Demonstrate knowledge of personal protective equipment (PPE) and its proper use in environmental science and renewable energy settings. This includes using PPE such as gloves, goggles, harnesses, and respirators during activities like handling hazardous materials, conducting energy system maintenance, and working in natural resource management. 3.E.2

3 Recognize the importance of mental and physical fitness for roles in environmental science and sustainability, emphasizing the ability to handle physically demanding tasks such as field research and energy system installations. 3.E.3

F The student prepares for a work-based learning experience by demonstrating professional skills. The student is expected to: 3.F

1 Develop a professional resume, portfolio, or skills showcase highlighting technical competencies, certifications, and industry-aligned projects in environmental science, renewable energy, and sustainability engineering. 3.F.1

2 Review and prepare for industry-recognized certifications, such as GIS Certification, Solar System Installation Certification, or Chesapeake Bay Landscape Professional Certification, demonstrating readiness for real-world application. 3.F.2

3 Practice interview skills and demonstrate knowledge of workplace expectations in environmental and sustainability-focused industries, including renewable energy firms, conservation organizations, and sustainability consulting. 3.F.3

4 Set career-related goals for a work-based learning experience, identifying specific technical and soft skills to develop and refine for future roles in environmental science, renewable energy, and sustainability engineering. 3.F.4