Maryland CTE Programs of Study

# Renewable Energy I (2025)

**GENERAL REQUIREMENTS This course is recommended for students in Grades 9-10.** 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 (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 Introduction to Renewable Energy I introduces students to foundational topics such as the dynamics of ecosystems, fundamentals of renewable energy, principles of sustainable resource management, and the ethical responsibilities in environmental fields. This course lays the groundwork for understanding the critical role of environmental science and resource management in addressing global challenges such as climate change, biodiversity loss, and energy sustainability, alignment from MSDE Environmental Literacy standards in combination of CTE and Science in Maryland.** 2.D

**E 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

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**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, including punctuality, professional appearance, and adherence to protocols. 3.A.1
2. Exhibit effective communication and active listening skills when collaborating on environmental science projects, renewable energy initiatives, and sustainability challenges. This includes presenting technical findings and engaging with diverse audiences such as peers, industry professionals, and community members. 3.A.2
3. Solve problems using critical thinking and decision-making skills, particularly when analyzing data, designing renewable energy solutions, or addressing environmental challenges such as resource conservation, pollution management, and climate adaptation operations. 3.A.3
4. Demonstrate leadership and teamwork skills through group activities, project-based learning, and focused exercises. These may include planning and executing conservation projects, renewable energy installations, or geospatial mapping initiatives. 3.A.4
5. Gain an understanding of ethical and legal responsibilities in environmental science and sustainability professions. This includes addressing environmental regulations, adhering to safety standards, and promoting sustainable practices in compliance with local, state, and federal guidelines. 3.A.5

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

1. Design a career plan that includes a clear pathway for advancement within energy, natural resources, and sustainability engineering careers, highlighting continuous education, certifications, and specialization opportunities in fields such as environmental science, renewable energy, and resource management. Examples may include pathways to roles like Environmental Scientist, Renewable Energy Technician, or Sustainability Engineer. 3.B.1
2. Develop a career plan that includes the necessary education, certifications, job skills, and experience for roles in energy and environmental industries. This plan may outline progression from entry-level technician roles to leadership or specialized positions, such as Environmental Policy Analyst, GIS Specialist, or Environmental Engineering Technologist. 3.B.2
3. Demonstrate effective interview skills for roles in environmental science, sustainability, or renewable energy industries, with a focus on entry-level positions. These skills include articulating knowledge of industry-specific challenges, certifications, and practical experience gained through work-based learning opportunities. 3.B.3

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**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
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 into 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 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

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

1. Describe National Electrical Code (NEC) requirements for renewable-energy system wiring (Article 690) and explain why licensed electricians or supervised apprentices must perform all permanent solar/wind/hydro installations in Maryland. 3.E.1
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