

Natural Resources Management

The Natural Resources Management Program is designed to prepare students for careers in the [Energy & Natural Resources Cluster](#), including environment science, agriculture, natural resource management, renewable energy production, forestry, natural-resource conservation and wastewater & water quality.

Related Careers: Conservation Scientist, GIS Technician, GIS Analyst, Remote Sensing Analyst, Environmental Engineer, Drone Pilot				
Grade ->	9	10	11	12
Completer Program Requirements (4 minimum Credits) *Optional Courses			Natural Resources And Ecology Environmental Science Issues Intro to Natural Resources Technology	*Geographic Information Systems *Unmanned Aircraft Systems *NRM Capstone *Career Connected Learning *DE - GEOSC 103 - Environmental Sustainability @ CCC
Additional Recommended Courses	CASE -Introduction to Agriculture, Food, and Natural Resources; Aquatic Environmental Science; Terrestrial Environmental Science; AP Environmental Science; AP Human Geography			
Certification and College Credit Opportunities	6 Transcribed Credits: Harrisburg University – GTSC 140, GTSC 107* Industry Recognized Credentials: FAA Part 107 License ESRI GIS Fundamentals Foundation (EGFF2201) Erosion and Sediment Control Certification Ducks Unlimited Ecology Conservation & Management Certification			

NRM Course Sequence

Required Course #1

NATURAL RESOURCES AND ECOLOGY

1 credit

This honors level course is a foundation course within the NRM sequence of courses. The course provides students with a variety of experiences that in the fields of natural resources and ecology. Students will explore hands-on projects and activities while studying topics such as land use, water quality, stewardship, and environmental agencies. Study of the natural world including biomes, land, air, water, energy, use and care as well as a focus on issues surrounding man's interaction with the Earth will be addressed in this course. Students will select an ecosystem to study throughout the course and apply principles of natural resources and ecology from each unit of study to that ecosystem.

Required Course #2

ENVIRONMENTAL SCIENCE ISSUES

1 credit

This honors level course is a specialization-level course that enables students to research, analyze, and propose sustainable solutions to environmental issues. Students are immersed in inquiry-based exercises filled with activities, projects, and problems, which develop data acquisition and analysis techniques, critical thinking and evaluation abilities related to environmental issues, as well as independent research and problem solving.

Required Course #3

INTRO TO NATURAL RESOURCES TECHNOLOGY

1 credit

This honors level course will introduce students to Natural Resources technology through academic study and applied instruction. This course provides the foundational knowledge of geospatial information systems and unmanned aircraft operation. In this course students receive an overview of common Geospatial Technology applications of Unmanned Aircraft Systems (UAS), such as mapping and multi-spectral sensing. Students will be introduced to the content covered in the FAA Remote Pilot Certification Exam, as well as the Erosion and Sediment Control Exam. Follow-up applied practice application will direct the student to apply acquired skills to cases in the community using curricular and open-source data.

Optional Course #4

Geographic Information Systems 1&2

2 credits

The GIS curriculum aligns with Harrisburg University GSTC 140: Introduction to Geographic Information Systems (GIS). Four (4) college credits are possible when successfully completed with NRM Capstone course. The presentation of geospatial data is both an art and a science. The student will learn to use GIS to produce high quality maps that expose complex spatial information and relationships in a clear and easy-to-understand display. Cartographic concepts and techniques, used to create not only hard copy printed maps but also prepare cartographic data for modern devices such as web pages and digital media, are explored. The class emphasizes laboratory work and a final project that uses GIS from an initial map concept, through data collection and analysis, to a final product. Students will choose final projects designed to apply geospatial skills.

Optional Course # 5

UNMANNED AIRCRAFT SYSTEMS 1&2

2 credits

In this specialization course students will gain a deeper understanding of common Geospatial Technology applications of Unmanned Aircraft Systems (UAS), such as mapping and multi-spectral sensing. Students will learn the content required to pass the FAA Remote Pilot Certification exam. In addition to certification knowledge and geospatial applications, students will be introduced to aspects of starting a drone business and the pathways to careers in aviation

Optional Course #6

NRM CAPSTONE

1 credit

This course is the final course in the NRM completer. Students will apply the knowledge and skills acquired in previous courses in authentic ways to complete an individualized senior project. The project will involve intense problem-solving and research in a student selected career-focused area. Experiences may include but are not limited to research projects, extensive portfolios, and work-based learning opportunities. Projects and portfolios will be presented for review and critique.

Optional Course #7

Career Connected Learning

1 – 3 credits

This flexible, work-based learning course introduces students to real-world applications of classroom knowledge and technical skills through on-the-job experiences and reflective practices. Students engage in career exploration, skill development, and professional networking by participating in youth apprenticeships, registered apprenticeships, pre-apprenticeships, internships, capstone projects, or other approved career-connected opportunities. Variable credit (1–3) accommodates the required on-the-job training hours and related instruction. By integrating industry standards, employability skills, and personalized learning goals, Career Connected Learning I equips students to make informed career decisions, develop a professional portfolio, and build a strong foundation for success in postsecondary education, training, or the workforce.

Optional Course #8

Dual Enrollment - **GEOSC 103 - Environmental Sustainability**

1 HS credit / 3 College Credits

Environmental Sustainability will study the interaction between humans, and the natural environment. Earth systems, such as biogeochemical cycles and climate dynamics, will be explored along with human population growth and development, energy usage, and the human impact on earth systems. Topics to be considered: Human society and consumption, energy basics, nonrenewable energy sources, nuclear energy, renewable energy sources, world pollution issues, electricity production, anthropogenic climate change, food and water security, sustainability and conservation. This course is intended to meet science requirement for non-science majors (*Fall, Spring*) *Three hours lecture each week.*

Sources of Standards:

1. Advance CTE's Career Clusters Framework

- a. **Description:** The Advance CTE framework provides a nationally recognized structure for organizing career and technical education (CTE) into Career Clusters. Each cluster represents a grouping of occupations and industries.
- b. **Use:** The framework serves as a foundational guideline for developing standards, ensuring alignment with industry-specific expectations, and highlighting essential knowledge and skills for each level of study.
- c. **Source:** Advance CTE Career Clusters: <https://careertech.org/career-clusters/>

2. Chesapeake Bay Landscape Professional (CBLP) Standards

- a. **Description:** Provides guidelines for sustainable landscape practices and environmental stewardship.
- b. **Use:** Ensures alignment with best practices for conservation and natural resource management.
- c. **Source:** Chesapeake Bay Landscape Professionals: <https://cblpro.org/>

3. ESRI Geographic Information Systems (GIS) Certification Standards

- a. **Description:** Establishes foundational GIS mapping skills for conservation, land management, and spatial analysis.
- b. **Use:** Integrates GIS certification for real-world environmental applications.
- c. **Source:** ESRI Certification: <https://www.esri.com/>

4. U.S. Environmental Protection Agency (EPA):

- a. **Description:** Sustainability and Environmental Engineering Resources.
- b. **Use:** Utilize EPA's guidelines and data for course content and research projects.
- c. **Source:** EPA Education Resources <https://www.epa.gov/students/>

5. Ducks Unlimited Ecology Conservation & Management

- a. **Description:** The Ducks Unlimited Ecology Conservation & Management Certification verifies an individual's expertise in key areas such as ecological principles, wildlife management, and habitat conservation.
- b. **Use:** Incorporating Ducks Unlimited standards into the curriculum ensures that students ensuring that professionals are well-prepared to contribute to the protection and management of natural resources.
- c. **Source:** Ducks Unlimited: [Ducks Unlimited Ecology Conservation & Management Certification | Ducks Unlimited](https://ducksunlimited.org/certification/)

6. Outdoor Learning Project (OLP)

- a. **Description:** Empowering all of Maryland's youth to grow as environmental stewards that access, conserve, and restore our natural resources to ensure a climate-ready Maryland.
- b. **Use:** OLP reports to and advises the Governor on the status of the Partnership's work in an annual report each year by January 30th.
- c. **Source:** Outdoor Learning Partnership: <https://marylandpublicschools.org/programs/Pages/Environmental-Education/Outdoor-Learning-Partnership.aspx>

7. **Maryland Department of the Environment (MDE) Erosion and Sediment Control**
- a. **Description:** This course is intended to provide the necessary training for individuals acting as the “Responsible Person” tasked with implementing and maintaining erosion and sediment controls as required by State law. It is also available to any person with an interest in learning about Maryland’s erosion and sediment control program and how it protects local water resources and Chesapeake Bay.
 - b. **Use:** Valid MDE certification is required for all engineers, designers, contractors, project managers, supervisors, inspectors, and personnel responsible for E&S Control implantation, installation, maintenance, and inspection working on projects in the State of Maryland.
 - c. **Source:** Maryland Department of the Environment [Soil Erosion and Sediment Control](#)