Delaware Department of Education

CTE & STEM Office

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Dover, DE 19901

PHONE: 302.735.4015 FAX: 302.739.1780

**DELAWARE CTE PROGRAM OF STUDY APPLICATION**

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| LOCAL EDUCATION AGENCY INFORMATION | | |
| **Local Education Agency (LEA):** | | |
| **School(s) where the Program of Study will be Located:** | | **Program of Study Start Date:** |
| **LEA CTE Coordinator Name:** **Phone:** **E-Mail Address:** | | |
| **Career Cluster Title:**  Agriculture, Food, and Natural Resources | **Career Pathway Title:**  Environmental Services | **Program of Study Title:**  Environmental and Natural Resource Science |
| **CTE Program of Study Course Titles & Sequence:**   1. Natural Resources and Ecology (NRE) 2. Environmental Science Issues (ESI) 3. AP Environmental Science (ES) | | |
| **CTE Program of Study Request:**  State-model CTE Program of Study  Local CTE Program of Study | | |
| ASSURANCES & SIGNATURES | | |
| CTE Program of Study approval and funding is contingent upon the following assurances:   1. The LEA will comply with Delaware Administrative Code, 14 Del.C. §525, Requirements for Career and Technical Education Programs and the Delaware State Plan for the Carl D. Perkins Career and Technical Education Act of 2006; 2. The LEA will submit CTE program data as required by the Delaware Department of Education; 3. All teachers are certified in the appropriate CTE area and participate in program specific professional learning; 4. The LEA will convene and engage a program advisory committee for the purposes of program development, implementation, and continuous improvement; 5. All students have equal access to the program of study as well as early career/early college options; 6. Career and Technical Student Organizations are integral components of the program of study; 7. The LEA will maintain safe facilities and equipment aligned with the program of study goals; and 8. A process for continuous improvement has been established, which includes a model of evaluation and program improvement. | | |
| LEA CTE Coordinator Signature: Date: | | |
| LEA Chief School Officer Signature: Date: | | |

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| PROGRAM ADVISORY COMMITTEE MEMBER INFORMATION |
| Complete the list of program advisory committee members. Program of study representatives should include, but are not limited to: CTE and academic teachers, CTE/curriculum district coordinators, school counselors, business and industry representatives, labor representatives, and post-secondary partners. Community stakeholders including parents and students can also be considered. *Attach additional information if applicable*. |
| Name: Title: |
| Affiliation: |
| Address: |
| Phone: E-Mail: |
| Area of Expertise: |
| Representing:  Business/Industry  Secondary Education  Post-Secondary Education  Community/Other |
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| Affiliation: |
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| Area of Expertise: |
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| Phone: E-Mail: |
| Area of Expertise: |
| Representing:  Business/Industry  Secondary Education  Post-Secondary Education  Community/Other |
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| LABOR MARKET DEMAND |
| Certify that a labor market needs analysis has been completed for the proposed CTE program of study. Attach the [*Labor Market Information (LMI) Review*](http://www.doe.k12.de.us/Page/435) document. |
| Access the [*Labor Market Information (LMI) Review*](http://www.doe.k12.de.us/Page/435) document.  The LEA certifies that regional, state, and local labor market data have been reviewed to assure a demand exists for the POS occupations and that the number of POS completers will not significantly exceed this demand. Department of Labor data are available and/or documented. Supporting evidence of supply and demand is submitted with this proposal.  No data exist for POS due to a unique labor market demand. Supporting evidence of demand is submitted with this proposal. Evidence may include, but is not limited to: real-time labor market information, documentation of national, regional, state, or local labor trends, or letters from employers or workforce agencies documenting projected employment specific to the career pathway. |

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| ACADEMIC AND TECHNICAL SKILL STANDARDS |
| List the academic, technical, and workplace skills and knowledge used to develop the program of study. |
| **Title and source of academic standards:**  [Common Core State Standards (CCSS)](http://www.corestandards.org/)  The Common Core State Standards (CCSS) are national standards that set clear college- and career-ready expectations for kindergarten through 12th grade in English language arts/literacy and Mathematics. The standards help to ensure that students graduating from high school are prepared to take credit bearing introductory courses in two- or four-year college programs and enter the workforce. The standards were developed by the nation's governors and education commissioners, through their representative organizations, the National Governors Association Center for Best Practices (NGA) and the Council of Chief State School Officers (CCSSO). Teachers, parents, school administrators, and experts from across the country provided input into the development of the standards. The implementation of the Common Core, including how the standards are taught, the curriculum developed, and the materials used to support teachers as they help students reach the standards, is led entirely at the state and local levels. For more information on CCSS, please visit the link above.  [Next Generation Science Standards (NGSS)](http://www.nextgenscience.org/)  The Next Generation Science Standards (NGSS) are national standards for science that lay out the disciplinary core ideas, science and engineering practices, as well as crosscutting concepts that students should master in preparation for college and careers. The standards were developed through a state-led effort that was managed by Achieve. The development of the NGSS involved the National Research Council (NRC), the National Science Teachers Association (NSTA), the American Association for the Advancement of Science (AAAS), and other critical partners such as K–12 teachers, state science and policy staff, higher education faculty, scientists, engineers, cognitive scientists, and business leaders. For more information on the NGSS, please visit the link above.  [Curriculum for Agriculture Science Education (CASE)](http://www.case4learning.org/)  CASE programs are developed using elements and pedagogical approaches that are recognized as proven and effective modes of teaching and learning. CASE lessons align with academic standards for AFNR and the academic subject areas of science, mathematics, and English language/arts. Core academic standards ([CCSS](http://www.corestandards.org/) and [NGSS](http://www.nextgenscience.org/)) are used in the development of lesson concepts when natural connections with science, mathematics, or English language elements are present. A standards and objectives alignment tool is available for all courses at: [www.case4learning.com](http://www.case4learning.com). |
| **Title and source of technical skill standards:**  [Agriculture, Food, and Natural Resources (AFNR) Career Cluster Content Standards](https://www.ffa.org/thecouncil/afnr)  These standards are intended to shape the design of an agricultural education program including: 1) Classroom and laboratory instruction; 2) Work-based learning experiences such as Supervised Agricultural Experience (SAE) Programs and internships; and 3) Career and Technical Student Organization (CTSO) experiences through organizations such as the National FFA Organization. For more information on the AFNR standards, please visit the link above. |
| **Title and source of workplace or other skill standards, as applicable:**  [Common Career Technical Core (CCTC)](http://www.careertech.org/CCTC)  The Common Career Technical Core (CCTC) are national standards for Career & Technical Education (CTE) that help inform the establishment of state standards and/or programs of study. The CCTC were developed by educators, school administrators, representatives from business and industry, faculty from higher education, as well as workforce and labor markets economists. The CCTC includes a set of standards for each of the sixteen (16) Career Clusters and the corresponding Career Pathways that help to define what students should know and be able to do after completing instruction in the ENRS program of study. Within the ENRS program of study, the CCTC standards for the Agriculture, Food, and Natural Resource (AFNR) Career Cluster have been embedded in each course. The program has students apply the CCTC AFNR standards, specifically the Environmental Service Systems Career Pathway standards. For more information on the CCTC, please visit the link above.  [Career Ready Practices (CRP)](http://www.careertech.org/career-ready-practices)  The Career Ready Practices (CRP) are a component of the CCTC framework and includes twelve (12) statements that address the knowledge, skills, and dispositions that are important to becoming career ready. The CRP describes the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline, or level of education and should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a career pathway. Within the ENRS program of study, the CRP statements are embedded throughout the program to ensure students display the appropriate workplace and soft skills required to be successful in a career. For more information on the CRP, please visit the link above. |

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| EARLY CAREER AND EARLY COLLEGE OPPORTUNITIES |
| Identify CTE program of study early career opportunities, industry-recognized certifications and licenses, options for early college credit, two- and four-year degree and certification program alignment, and the technical skill attainment measures for the program of study. *Attach articulation/dual enrollment agreement(s)*. |
| **Describe early career opportunities (i.e. work-based learning experiences and industry-mentored projects):**  The Environmental and Natural Resource Science (ENRS) program is a three (3) course program of study that provides students with the scientific principles and methods required to understand the interrelationships of the natural world, identify and analyze environmental problems that are natural and human-made, evaluate risks associated with these problems, and examine alternative solutions. Work-based learning experiences and industry-mentored projects are included in each course and will be reviewed with the Local Education Agency (LEA) Program Advisory Council to further identify opportunities to engage the community.  Students will participate in an environmental and natural resource science focused Supervised Agriculture Experience (SAE) program. Through involvement in an SAE program, students will consider multiple careers and occupations, demonstrate workplace behavior, develop skills within the environmental and natural resource sciences, and apply academic and occupational skills in the workplace or a simulated workplace environment. Through these strategies, students will apply classroom learning as they prepare to transition into college and career opportunities. Students will participate in one of the following SAE programs: Ownership/Entrepreneurship, Placement/Internship, Research, Exploratory, School-Based Enterprise, or Service Learning.    Local business partners and natural resource agencies work with educators by serving on advisory boards and as mentors to provide a real-world connection to ENRS coursework. Work-based learning experiences and industry-mentored projects are included in each course and will be reviewed with the LEA Program Advisory Council (PAC) to further identify opportunities to engage the community.  Upon successful completion of Environmental Science Issues (ESI) and/or AP Environmental Science (ES), students will have the opportunity to participate in an organized internship program through the Delaware Department Natural Resources and Environmental Control (DNREC).  The duration of the program, application process, and deadline for submission will be determined by DNREC.  Students will earn a certificate of completion for their work and involvement in the DNREC internship process. |
| **List industry-recognized certifications and/or licenses, as appropriate (include the partner organization and credential):**  Curriculum for Agricultural Science Education (CASE) provides industry-based, end of course assessments for participating schools. CASE will report valid and reliable scores on overall student performance for each course. The end of course assessment(s) give students an objective evaluation of their achievement and stakeholders the opportunity to obtain and use data to make informed decisions. |
| **Describe early college credit options (i.e. advanced placement, dual enrollment, transcripted and/or articulated credit, credit by exam, pre-apprenticeship, other) and options for two- and four-year degree and/or certification program alignment (attach articulation/dual enrollment agreement). The partner organization and hours of credit earned should be included, as applicable:**  The [College Board](https://apstudent.collegeboard.org/home) partners with a broad range of colleges and universities across the country to recognize and reward the great work being accomplished in AP courses. Each college and university will make its own decisions about awarding credit and placement and most have a written policy earned credit for a given AP Exam, the amount of credit awarded, and how credits are applied. Opportunities for students typically include earned college credit, scholarships, and placement. For more information on the College Board, please visit the link above.  The Department of Education is currently negotiating articulation agreements with Delaware Technical Community College (DTCC), Delaware State University (DSU), and Wesley College (WC). |
| **List technical skill attainment measures for the program of study (i.e. industry recognized certification or license, advanced placement, dual enrollment, transcripted and/or articulated credit, dual enrollment, credit by exam):**  Certification/credentialing exam (specify):  Licensing exam (specify):  Nationally recognized exam (specify):  Advanced Placement - Environmental Science  Advanced standing (specify):  DTCC, DSU, and WC: In Progress  Other (specify): |

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| POS OVERVIEW, COURSE DESCRIPTIONS, END-OF-COURSE, AND PROGRAM ASSESSMENTS |
| Provide a CTE program of study overview that broadly describes the program and student expectations. Identify end-of-program assessment(s) and opportunities for students to participate in early college and early career experiences. List each course title in the CTE program of study. Provide an overview of each course and define what students should know and be able to demonstrate upon completion of each level. Identify appropriate end-of-course assessment(s). |
| **CTE Program of Study Overview:**  The Environmental and Natural Resource Science (ENRS) program of study is a three (3) course Career & Technical Education (CTE) instructional program designed to provide students with the scientific principles and methods required to understand the interrelationships of the natural world, identify and analyze environmental problems that are natural and human-made, evaluate risks associated with these problems, and examine alternative solutions. ENRS is interdisciplinary; it embraces a wide variety of topics from different areas of study and promotes unifying constructs, or themes, that cut across the topics included in the study of Environmental and Natural Resources. The program prepares students for a variety of careers including environmental engineer, environmental science and protection technician, geological and petroleum technician, natural sciences manager, wildlife biologist, and zoologist.   * **Natural Resources and Ecology (NRE)** provides students a variety of experiences in the fields of natural resources and ecology. Students explore hands-on projects and activities while studying topics such as land use, water quality, stewardship, and environmental agencies. NRE includes the study of the natural world including biomes, land, air, water, energy, use and care as well as a focuses on issues surrounding man's interaction with the Earth. 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. * **Environmental Science Issues (ESI)** 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. ESI includes hands-on experiences to develop data acquisition and analysis techniques, critical thinking and evaluation abilities related to environmental issues, as well as independent research and problem solving skills. * **AP Environmental Science** **(ES)** provides students with the scientific principles and methods required to understand the interrelationships of the natural world, identify and analyze environmental problems that are natural and human-made, evaluate risks associated with these problems, and examine alternative solutions for resolving or preventing these issues. Students will apply their knowledge of the environment to current environmental issues in their own communities. |
| **End-of-Program Assessment(s):**  Certification/credentialing exam (specify):  Licensing exam (specify):  Nationally recognized exam (specify):  CASE End of Course Assessments  College Board Assessment: AP Environmental Science  Other (specify): |
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| **Course title:**  Natural Resources and Ecology (NRE) |
| **Course description (include prerequisites):**  This course provides students a variety of experiences in the fields of natural resources and ecology. Students explore hands-on projects and activities while studying topics such as land use, water quality, stewardship, and environmental agencies. NRE includes the study of the natural world including biomes, land, air, water, energy, use and care as well as a focuses on issues surrounding man's interaction with the Earth. 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. |
| **Course knowledge and skills (what students will know and be able to do):**  By the end of this course students will:   1. Apply research skills; use scientific note taking to record observations; and utilize multimedia to present information. 2. Describe the process of soil formation; determine soil texture; describe the differences in soil structure types; compare the permeability and filtration capacity of different soil types; calculate slope of an area of land; classify land according to appropriate use based on slope, erosion factors, drainage, and workability; read a topographic map; design and conduct an experiment to determine the effects of slope and vegetation on erosion; and use the Web Soil Survey. 3. Explain the hydrologic cycle and define terms used in describing the movement of water through the cycle; research aquatic ecosystems; compare aquatic ecosystems and note differences and similarities; conduct water quality tests to determine the temperature, pH, turbidity, dissolved oxygen, total solids, biochemical oxygen demand, phosphates, nitrates, and fecal coliform from a local sample of water; calculate the quality of local water by completing the Water Quality Index; predict and simulate how landforms influence the movement of surface water; and compare Q-Values and Water Quality Indexes at two river locations and analyze the causes of the changes. 4. Identify the levels of the atmosphere and their defining characteristics; compare the movement of atmospheric gases, oxygen and nitrogen, to the water cycle; measure the level of particulate matter from the air, the amount and percentage of light blocked by the particulate matter; compare air quality levels for different locations, demonstrating understanding of the Air Quality Index; and define the greenhouse effect. 5. Explain the food web and determine the sequence of energy flow of a group of organisms; calculate the percent of energy transfer through the trophic levels of a food chain; determine the habitat area requirements for a group of animals in an ecosystem and the overall area needed to sustain the ecosystem; determine the biodiversity of plants in a given area using a common sampling technique; and research the habitat requirements of an animal. 6. Predict the probability of the occurrence of qualitative traits within an animal species; conduct hypothetical wildlife management decisions and identify factors that can affect the size of a wildlife population; and make a habitat management plan. 7. Apply skills and knowledge learned regarding stewardship and sustainable agriculture management decisions related to a fictitious property; determine a commodity to raise; apply for a stewardship program; and determine the best stewardship practices to implement. 8. Determine the value of a tree using the National Tree Benefit calculator; calculate board feet of lumber, timber and estimate the value of local trees; and develop a forest management plan summary based on research. 9. Synthesize and make connections to the different practices and methods that are used to mine important mineral resources; investigate the process of enhanced oil recovery while considering the resources used to recover the oil; investigate methods for cleaning up oil spills; design and test an oil water separator; and characterize the effects of oil spills on ecosystems and humans. 10. Determine the personal carbon footprint and the carbon footprint of a family and consider how to reduce their carbon emission impact on the natural environment; investigate the positive and negative impacts of waste on the environment and how to improve the environmental costs of waste management; identify the current uses and the historical states of outdoor recreational areas in their ecosystem and determine how human use has impacted the native species in both beneficial and harmful ways; and investigate and plan an outdoor experience that incorporates personal interests while leaving the smallest footprint possible to protect the integrity of the natural resource. 11. Research species classified as endangered, threatened, sensitive, or extinct; explore the impact of natural resource and conservation practices and policies in relation to sustainability; research federal natural resource agencies and identify primary purposes and responsibilities each agency has regarding water contamination; and develop a multiple use management plan for the ecosystem they have studied throughout the course. |
| **End-of-Course Assessment(s):**  Teacher designed assessment  LEA designed assessment  Certification/credentialing exam (specify):  Licensing exam (specify):  Nationally recognized exam (specify): CASE End of Course Assessment - NRE  Other (specify): Supervised Agriculture Experience (SAE) Program |
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| **Course title:**  Environmental Science Issues (ESI) |
| **Course description (include prerequisites):**  This 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. ESI includes hands-on experiences to develop data acquisition and analysis techniques, critical thinking and evaluation abilities related to environmental issues, as well as independent research and problem solving skills.  Prerequisite: Natural Resources and Ecology (NRE) and Physical/Earth Science\*  \* Students may be concurrently enrolled in ESI while completing this course. |
| **Course knowledge and skills (what students will know and be able to do):**  By the end of this course students will:   1. Investigate an environmental problem that may occur locally; research environmental problems that occur locally, nationally, and globally; categorize environmental issues, problems, and facts; analyze issues by identifying key terms, historical viewpoints, and facts; and use multiple sources to identify economic, political, and ethical aspects of an issue. 2. Explore personal beliefs and knowledge to gain perspective on environmental issues; explore public perception of an environmental issue and identify forms of bias in media sources; analyze and practice effective communication behaviors; and identify effective conflict resolution behaviors. 3. Describe the precision and accuracy of data sets; compare the precision of different measuring devices; analyze an experimental data set using mean mode median and range; measure volume and distance with differing degrees of uncertainty; analyze and display environmental data using a Geographic Information System (GIS); and collect quantitative and qualitative environmental data. 4. Practice methods of collecting data to measure biodiversity; explain the interdependent relationship of organisms in a pond; analyze and compare data to calculate the biodiversity of ecosystems; model population growth in an ecosystem; and compare species population, predation, and area to ecosystem productivity. 5. Explain natural and anthropogenic causes of population growth and decline of a species; explain the relationships between marine, estuarine, and fresh water stream food webs supporting a salmon population; design an ecosystem management plan to help a threatened species recover; and use a statistical model to manage a wildlife population. 6. Simulate transition from nonrenewable to renewable energy sources; evaluate technologies used to produce cellulosic ethanol; analyze cost and savings associated with home solar energy arrays; research and calculate the social, economic, and environmental costs of an energy source; compare the life cycle emissions of energy sources; and select energy sources for a community using the principles of full cost accounting. 7. Determine efficiency of energy sources; observe and explain how air pollution affects plant growth; analyze the relationship between population growth and air quality using a computer simulation; Investigate and research pollution in local areas; perform a home energy audit and make recommendations for changing energy choices and consumption; and calculate and analyze subsidies provided for energy sources. 8. Calculate the land and food energy requirements of a growing population; describe potential solutions for increasing the future food supply; explain and recommend sustainable practices for conserving natural resources in agricultural production; measure the biodiversity in soil from different agricultural environments; and research the effects of genetic modification on agriculture and the environment. 9. Test the effects of nitrogen and phosphorus on eutrophication; identify types and sources of pollutants in a river watershed; plot correlations between pollutants and physical and chemical stream characteristics; and compare fertilizer runoff in soils with different textures. 10. Explain how federal regulations affect local communities, agriculture, and the environment; identify actions to take to follow environmental laws and policies; use Global Positioning System (GPS) and GIS technologies to map environmental data; use GIS maps to identify and solve a potential environmental issue; complete an engineering design project to a solve water pollution issue in a specific area of the world; and design and test a water purification system. 11. Research an environmental issue with public interest; define a question and hypothesis to study in order to frame research; collect and summarize similar research conclusions; conduct a self-designed research project and collect data for results and analysis; and present research findings. |
| **End-of-Course Assessment(s):**  Teacher designed assessment  LEA designed assessment  Certification/credentialing exam (specify):  Licensing exam (specify):  Nationally recognized exam (specify): CASE End of Course Assessments - ESI  Other (specify): Supervised Agriculture Experience (SAE) Program |
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| **Course title:**  AP Environmental Science (ES) |
| **Course description (include prerequisites):**  This course provides students with the scientific principles and methods required to understand the interrelationships of the natural world, identify and analyze environmental problems that are natural and human-made, evaluate risks associated with these problems, and examine alternative solutions for resolving or preventing these issues. Students will apply their knowledge of the environment to current environmental issues in their own communities.  Prerequisites: Environmental Science Issues (ESI), Algebra, and Biological Sciences  *© 2014 The College Board. Visit the College Board on the Web:* [*www.collegeboard.org*](http://www.collegeboard.org) |
| **Course knowledge and skills (what students will know and be able to do):**  By the end of this course students will:   1. Analyze and interpret experimental data and mathematical calculations; identify environmental problems; and critically examine various solutions for resolving or preventing environmental problems by evaluating the associated ecological risks and human health risks. 2. Describe science as a method of learning more about the world; demonstrate how science constantly changes the way we understand the world; describe earth systems and analyze the effect of natural resources and earth system components on the living world; analyze how the atmosphere impacts weather and climate; explain global water resources and how they are used; and explain soil formation and soil dynamics. 3. Describe ecosystem structures and the dynamics of species interactions; explain how energy conversions underlie all ecological processes; demonstrate how energy flows through systems; explain ecosystem diversity and change; analyze how the Earth itself is one interconnected system; demonstrate how natural systems change over time and space; and explain how biogeochemical systems vary in ability to recover from disturbances. 4. Analyze how humans impact the environment; describe how technology and population growth have enabled humans to increase both the rate and scale of their impact on the environment; describe how environmental problems have a cultural and social context; describe how the role of cultural, social, and economic factors is vital to the development of solutions; explain why human survival depends on developing practices that will achieve sustainable systems; and describe the multiple uses of land and water and how the uses affect ecosystems differently. 5. Describe the different sources and forms of energy; explain the Laws of Thermodynamics; and demonstrate how energy cannot be created. 6. Describe the different forms of pollution; analyze forms of pollution and the effect on the environment, human health, and the economy; explain cultural eutrophication; describe groundwater pollution and how to maintain and test water quality; demonstrate the steps in water purification; describe the process of sewage treatment; and explain the Clean Water Act and other relevant laws. 7. Describe the Stratospheric Ozone; explain global warming and its effects; and explain the causes of habitat loss, how it can be maintained through conservation, and the relevant laws and treaties that exist in relation to the loss of biodiversity. |
| **End-of-Course Assessment(s):**  Teacher designed assessment  LEA designed assessment  Certification/credentialing exam (specify):  Licensing exam (specify):  Nationally recognized exam (specify): College Board Assessment: AP Environmental Science  Other (specify): Supervised Agriculture Experience (SAE) Program |

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| PROGRAM OF STUDY CURRICULUM |
| Identify the method of technical and academic curriculum development (adopted, adapted, or developed in accordance with guidance from the program advisory committee). |
| **POS technical and academic curriculum will be:**  Adopted (specify source): State model program of study  Adapted (specify source):  Developed locally (describe):  Other (specify): |

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| TEACHER CERTIFICATION |
| Provide valid teacher certification(s), candidate experience, pre-requisite and requisite licensure or certification requirement(s) for POS teachers. |
| **POS teacher requirements include:**  Teacher certification(s) (list): AgriScience Education or Skilled and Technical Sciences (STS) in Natural Resources Systems  Candidate experience (describe): Candidate may have experience in maintaining, or protecting areas such as forests, forested areas, woodlands, wetlands, and rangelands through such activities as raising and transporting seedlings; combating insects, pests, and diseases harmful to plant life; building structures to control water, erosion, and leaching of soil; or planning, directing, or coordinating activities in such fields as life sciences, physical sciences, mathematics, statistics, and research and development in these fields. Candidates may also have experience in collecting and analyzing biological data to determine the environmental effects of present and potential use of land and water habitats; investigating the growth, structure, development, and other characteristics of microscopic organisms, such as bacteria, algae, or fungi; or applying theory and principles of environmental engineering to modify, test, and operate equipment and devices used in the prevention, control, and remediation of environmental problems, including waste treatment and site remediation, under the direction of engineering staff or scientist. For more information, please see the Bureau of Labor Statistics: Miscellaneous Management and Management Support Occupations, Biological/Life Science, and Forestry and Conservation.  Pre-requisite professional licensure or certification requirement(s) (list):  Requisite professional licensure or certification requirement(s) (list):  Other (describe): |

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| VALUE-ADDED OPPORTUNITIES |
| List extended early career and college credit opportunities available during the student’s senior year. Document transition services, cooperative learning experiences, additional dual enrollment, or other. |
| **Opportunities for extended and accelerated learning include:**  Cooperative education (describe):  Structured internship (describe):  Dual enrollment (list):  Advanced Placement (list):  Transition services (describe):  Other (describe): |

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| CAREER AND TECHNICAL STUDENT ORGANIZATIONS |
| Indicate the Career and Technical Student Organization (CTSO) affiliation by checking the appropriate box. |
| FFA |

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| PROGRAM OF STUDY MATRIX |
| Complete the program of study matrix to demonstrate the alignment of academic and technical courses, culminating early career and/or early college experiences. Identify appropriate certification and licensure options, opportunities for obtaining early college credit (courses with articulated or dual enrollment credit agreements should be appropriately designated within the matrix), the post-secondary program sequence, and potential career options. *Attach the Program of Study Matrix*. |
| Access the [Program of Study Matrix](http://www.doe.k12.de.us/Page/2016). |

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| DEPARTMENT OF EDUCATION PROGRAM OF STUDY APPROVAL | | |
| The following section will be completed by staff from the Delaware Department of Education, CTE & STEM Office and reported to the LEA as part of the CTE program of study approval process. | | |
| **Date Delaware CTE Program of Study Application Received:** | | |
| **Local Education Agency (LEA):**    **School(s):** | | **Program of Study Start Date:** |
| **LEA CTE Coordinator Name:** **Phone:** **E-Mail Address:** | | |
| **Career Cluster & Code:**  Agriculture, Food, and Natural Resources | **Career Pathway & Code:**  Environmental Service Systems / 1.06 | **Program of Study Title & Code:**  Environmental and Natural Resource Science / 1.06601 |
| **CTE Program of Study Course Titles, Course Codes, and Funding Levels:**  1. Natural Resources and Ecology (NRE) / 1.0660111 / 3  2. Environmental Science Issues (ESI) / 1.0660122 / 3  3. AP Environmental Science (ES) / 1.0660133 / 3 | | |
| **CTE Concentrator/Completer Course Titles:**  Concentrator Course: Environmental Science Issues (ESI)  Completer Course: AP Environmental Science (ES) | | |
| **CTE Program of Study Request:**  State-model CTE Program of Study  Local CTE Program of Study | | |
| **CTE Program of Study Attachments:**  Labor Market Information (LMI) Review;  Articulation/Dual Enrollment Agreement(s); and  Program of Study Matrix. | | |
| DDOE CTE & STEM Director Signature: Date: | | |
| DDOE Chief Academic Officer Signature: Date: | | |