Vermont Career Technical Education (CTE) Program Critical Proficiencies

Forestry, Natural Resources CTE Programs

The Critical Proficiencies identify the essential knowledge, skills, and abilities that VT CTE students need to demonstrate (1) to be program completers, and (2) to be prepared for future learning. Critical proficiencies promote high expectations for all students, and support students' personal, professional, and academic development. At the high school level, VT's Proficiency-Based Graduation Requirements (PBGRs) reflect the critical proficiencies that lead to postsecondary career and college readiness.

For each of the unique program areas which categorize VT's CTE programs, the proficiency template includes:
- Program-Area Descriptions
- Career Ready Practices
- Career Cluster(s) and Pathway(s)
- Anchor Standards
- Program Technical Standards
- Academic Alignment
- CTE Program Elements

Advance CTE Common Career Technical Core - Career Ready Practices
The Common Career Technical Core (CCTC) is a state-led initiative to establish a set of rigorous, high-quality standards for Career Technical Education (CTE). The CCTC includes a set of standards for each Career Cluster® and corresponding Career Pathways that define what students should know and be able to do after completing instruction in a program of study. The CCTC also includes an overarching set of Career Ready Practices that apply to all programs of study. The Career Ready Practices include statements that address the knowledge, skills, and dispositions that are important to becoming career ready.

The Career Ready Practices were developed from a state-led initiative sponsored by the National Association of State Directors of Career Technical Education Consortium (NASDCTEC).

> Career Ready Practices describe 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. Career Ready Practices 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 program of study. (NASDCTEC, 2012)

The Career Ready Practices
- are applicable across all program areas.
- align with the VT Transferable Skills Proficiency-Based Graduation Requirements (PBGRs) and VT Portrait of a Graduate.
- are the *transferable skills* of the Common Career Technical Core and the *portrait* of a VT CTE program completer.

Advance CTE Common Career Technical Core - Career Cluster and Pathway Standards

The Common Career Technical Core is divided into Career Cluster and Pathway standards. Each Career Cluster contains one or more pathways with pathway-specific technical standards. The template shows which CCTC Career Cluster and Pathway standards are relevant to VT CTE programs.

Anchor Standards

The Anchor Standards build upon the Career Ready Practices and show the overarching standards categories which are common across all technical programs within their Career Cluster(s) and Pathway(s). The VT CTE Anchor Standards are derived from and align with the CCTC Anchor Standards.

Program Technical Standards

The Program Technical Standards build on and continue the Anchor Standards with more complexity, rigor, and career specificity. Knowledge and skills are learned and applied within a standards-based CTE program that integrates classroom, laboratory, and work-based instruction. The VT CTE Program Technical Standards are tailored to the unique characteristics and structure of each of the program areas.

Academic Alignment

Each program-area template includes academic alignment with the VT Content-Area Sample Graduation Proficiencies as part of VT's Proficiency-Based Graduation Requirements (PBGRs). These include Common Core State Standards in English Language Arts and Mathematics, Next Generation Science Standards, as well as other adopted national and state academic standards.

CTE Critical Proficiency Template

Critical Proficiency Template:	Attributes of each section:
Program-Area Descriptions	For VT CTE Program Areas
Common Career Technical Core - Career Ready Practices	1. Act as a responsible and contributing citizen and employee. 2. Apply appropriate academic and technical skills. 3. Attend to personal health and financial well-being. 4. Communicate clearly and effectively and with reason. 5. Consider the environmental, social, and economic impacts of decisions. 6. Demonstrate creativity and innovation. 7. Employ valid and reliable research strategies. 8. Utilize critical thinking to make sense of problems and persevere in solving them. 9. Model integrity, ethical leadership, and effective management. 10. Plan education and career paths aligned to personal goals. 11. Use technology to enhance productivity. 12. Work productively in teams while using cultural global competence.
Common Career Technical Core - Career Cluster(s) and Pathway(s)	Relevant to VT CTE Program Areas
Anchor Standards	1. Academics 2. Communication 3. Problem Solving and Critical Thinking 4. Technology 5. Systems (Responsibility and Flexibility) 6. Health and Safety 7. Leadership and Teamwork 8. Ethics and Legal Responsibilities 9. Career Planning and Management 10. Technical Knowledge and Skills (see Program Technical Standards) 11. Demonstration and Application (see CTE Program Elements)
Program Technical Standards	Build on the Anchor Standards with more complexity, rigor, and career specificity

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Critical Proficiency Template:	Attributes of each section:
Academic Alignment	With VT Content-Area Graduation Proficiencies
CTE Program Elements	Demonstration and application: ● Dual Enrollment/Fast Forward Courses ● Industry Recognized Credentials (IRCs) ● Work-Based Learning/Co-op/Apprenticeship ● National Career Technical Student Organizations ● Entrepreneurship ● Portfolio/Personalized Learning Plan

VT Forestry, Natural Resources CTE Programs

Students in **Forestry** programs have in-depth, hands-on experiences in forest management and conservation; mapping and surveying; plant and tree physiology, anatomy, and taxonomy; pest and disease management; fire ecology; public and private land use; and business management.

Students in **Natural Resources** programs have in-depth, hands-on experiences in natural resources science and management; ecological concepts and scientific principles; renewable and nonrenewable resources; fish and wildlife ecology; outdoor recreation; public and private land use; environmental and natural resources conservation; and business management.

The standards in this program area are designed to prepare students for technical training, postsecondary education, and/or entry-level employment in the field of forestry and natural resources. Students engage in an instructional program that integrates academic and technical preparation, career exploration, and preparation for postsecondary education and/or training. Knowledge and skills are learned and applied within a standards-based CTE program that integrates classroom, laboratory, and work-based instruction.

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Advance CTE Common Career Technical Core - Career Ready Practices:	Aligned with **VT Transferable Skills** Proficiency-Based Graduation Requirements (PBGRs) and **VT Portrait of a Graduate**
1. Act as a responsible and contributing citizen and employee.	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community, and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
2. Apply appropriate academic and technical skills.	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
3. Attend to personal health and financial well-being.	Career-ready individuals understand the relationship between personal health, workplace performance, and personal well-being; they act on that understanding to regularly practice healthy diet, exercise, and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial wellbeing, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.

Advance CTE Common Career Technical Core - **Career Ready Practices**:	Aligned with **VT Transferable Skills** Proficiency-Based Graduation Requirements (PBGRs) and **VT Portrait of a Graduate**
4. Communicate clearly and effectively and with reason.	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
5. Consider the environmental, social, and economic impacts of decisions.	Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment, and the profitability of the organization.
6. Demonstrate creativity and innovation.	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
7. Employ valid and reliable research strategies.	Career-ready individuals are discerning in accepting and using new information to make decisions, change practices, or inform strategies. They use reliable research processes to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.

Advance CTE Common Career Technical Core - **Career Ready Practices**:	Aligned with **VT Transferable Skills** Proficiency-Based Graduation Requirements (PBGRs) and **VT Portrait of a Graduate**
8. Utilize critical thinking to make sense of problems and persevere in solving them.	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
9. Model integrity, ethical leadership, and effective management.	Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' actions, attitudes, and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals, and organizational culture.
10. Plan education and career paths aligned to personal goals.	Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience, and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.

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Advance CTE Common Career Technical Core - **Career Ready Practices**:	Aligned with **VT Transferable Skills** Proficiency-Based Graduation Requirements (PBGRs) and **VT Portrait of a Graduate**
11. Use technology to enhance productivity.	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks - personal and organizational - of technology applications, and they take actions to prevent or mitigate these risks.
12. Work productively in teams while using cultural global competence.	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural differences to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Advance CTE Common Career Technical Core - Agriculture, Food, and Natural Resources Career Cluster and Pathway Standards

The following Career Cluster and Pathway standards are relevant to VT Forestry and Natural Resources CTE programs:	This Career Cluster® is focused on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources including food, fiber, wood products, natural resources, horticulture, and other plant and animal products or resources.
Agriculture, Food, and Natural Resources Career Cluster	1. Analyze how issues, trends, technologies, and public policies impact systems in the Agriculture, Food & Natural Resources Career Cluster. 2. Evaluate the nature and scope of the Agriculture, Food & Natural Resources Career Cluster and the role of agriculture, food, and natural resources (AFNR) in society and the economy. 3. Examine and summarize the importance of health, safety, and environmental management systems in AFNR businesses. 4. Demonstrate stewardship of natural resources in AFNR activities. 5. Describe career opportunities and means to achieve those opportunities in each of the Agriculture, Food & Natural Resources Career Pathways.

The following Career Cluster and Pathway standards are relevant to VT Forestry and Natural Resources CTE programs:	This Career Cluster® is focused on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources including food, fiber, wood products, natural resources, horticulture, and other plant and animal products or resources.
	6. Analyze the interaction among AFNR systems in the production, processing, and management of food, fiber, and fuel and the sustainable use of natural resources.
Environmental Services Systems Pathway	1. Use analytical procedures and instruments to manage environmental service systems. 2. Evaluate the impact of public policies and regulations on environmental service system operations. 3. Develop proposed solutions to environmental issues, problems and applications using scientific principles of meteorology, soil science, hydrology, microbiology, chemistry, and ecology. 4. Demonstrate the operation of environmental service systems (e.g., pollution control, energy conservation). 5. Use tools, equipment, machinery, and technology common to tasks in environmental service systems.
Natural Resources Systems Pathway	1. Plan and conduct natural resource management activities that apply logical, reasoned, and scientifically based solutions to natural resource issues and goals. 2. Analyze the interrelationships between natural resources and humans. 3. Develop plans to ensure sustainable production and processing of natural resources. 4. Demonstrate responsible management procedures and techniques to protect or maintain natural resources.

VT CTE Program Anchor Standards

Anchor Standards:	Aligned with Advance CTE Common Career Technical Core - Career Cluster Anchor Standards
1. Academics	Achieve additional academic knowledge and skills required to pursue the full-range of career and postsecondary education opportunities.

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Anchor Standards:	Aligned with Advance CTE Common Career Technical Core - Career Cluster Anchor Standards
2. Communication	Acquire and accurately use terminology and information at the career and college readiness level for communicating effectively in oral, written, and multimedia formats.
3. Problem Solving and Critical Thinking	Conduct short, as well as more sustained, research to create alternative solutions to answer a question or solve a problem using critical and creative thinking; logical reasoning, analysis, inquiry, and problem-solving techniques.
4. Technology	Use existing and emerging technology to investigate, research, and produce products and services, including new information, as required in the workplace environment.
5. Systems (Responsibility and Flexibility)	Initiate, and participate in, a range of collaborations to demonstrate behaviors that reflect personal and professional responsibility, flexibility, and respect in the workplace environment and community settings.
6. Health and Safety	Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the workplace environment.
7. Leadership and Teamwork	Work with peers to promote divergent and creative perspectives, effective leadership, group dynamics, team and individual decision making, benefits of workforce diversity, and conflict resolution.
8. Ethics and Legal Responsibilities	Practice professional, ethical, and legal behavior, responding thoughtfully to diverse perspectives and resolving contradictions when possible, consistent with applicable laws, regulations, and organizational norms.
9. Career Planning and Management	Integrate multiple sources of career information from diverse formats to make informed career decisions, solve problems, and manage personal career plans.
10. Technical Knowledge and Skills (see Program Technical Standards)	Apply essential technical knowledge and skills common to the Career Cluster and Pathway(s), following procedures when carrying out experiments and/or performing technical tasks.

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Anchor Standards:	Aligned with Advance CTE Common Career Technical Core - Career Cluster Anchor Standards
11. Demonstration and Application (see CTE Program Elements)	Demonstrate and apply technical knowledge and skills across a variety of CTE-specific opportunities in classroom, laboratory, and workplace settings.

VT Forestry CTE Program Technical Standards

Program Technical Standards:	Standards for each career path build on and continue the Anchor Standards with more complexity, rigor, and career specificity.
1. Safety and Equipment	a. Describe and practice personal, workplace, and equipment safety procedures and protocols. b. Interpret established personal, workplace, and equipment safety procedures and protocols; develop and implement improved procedures. c. Follow proper hazardous chemical/material control procedures and regulations. d. Operate and maintain forestry tools and equipment in a variety of settings.
2. Forest Management	a. Explore and implement forest management practices, including fire ecology. b. Utilize compass, GPS, and mapping instruments and interpret topographic maps and aerial imagery; apply to a real world forest management scenario. c. Utilize surveying equipment to measure acreage and distance. d. Describe tree species by characteristics (i.e., leaves, twig, bark). e. Summarize basic plant physiology, anatomy, and taxonomy. f. Describe how to protect forests from pests and diseases; develop and/or critique a management plan. g. Apply mathematical concepts and operations to perform forest management tasks. h. Explain and apply scientific concepts (i.e., photosynthesis, climate change, evolution) as they relate to forestry.
3. Environmental Conservation	a. Appraise best management practices for environmental conservation.

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Program Technical Standards:	Standards for each career path build on and continue the Anchor Standards with more complexity, rigor, and career specificity.
	b. Explain soil formation processes, soil erosion, and nutrient cycling. c. Describe air and water use, their management practices, and conservation strategies. d. Explain the water cycle and relate ecological issues associated with surface water runoff. e. Investigate wildlife habitat and management concepts. f. Describe outdoor recreation and its relationship to forestry practices. g. Recognize public and private land use issues; develop and propose solutions.
4. Business Management	a. Produce, harvest, process, and market products from forestry industries. b. Explain and utilize general business and management skills. c. Develop a business plan and identify sources of credit. d. Identify and maintain financial and technical record keeping systems.
5. Communication	a. Demonstrate effective verbal and written communication skills in the forestry classroom, laboratory, and work site.
6. Leadership and Teamwork	a. Demonstrate an ability to work independently and as a collaborative forestry team member.
7. Ethics and Legal Responsibilities	a. Recognize the professional and ethical standards that are required in forestry.
8. Career Development	a. Identify and explore career options and pathways in the field of forestry, as well as required training and certification processes.

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Program Technical Standards:	Standards for each career path build on and continue the Anchor Standards with more complexity, rigor, and career specificity.
1. Safety and Equipment	a. Practice personal, workplace, and equipment safety procedures and protocols. b. Analyze established personal, workplace, and equipment safety procedures and protocols; develop and implement improved procedures. c. Follow proper hazardous chemical/material control procedures and regulations. d. Operate and maintain natural resources lab and field instruments, tools, and equipment in a variety of settings.
2. Natural Resources Management	a. Explore and implement natural resources management practices. b. Explain forest management practices, including fire ecology. c. Utilize compass, GPS, and mapping instruments and interpret topographic maps and aerial imagery; apply to a real world natural resources management scenario. d. Utilize surveying equipment to measure acreage and distance. e. Identify tree species by characteristics (i.e., leaves, twig, bark). f. Explore basic plant physiology, anatomy, and taxonomy. g. Investigate wildlife management and habitat. h. Describe how to protect natural resources from pests and diseases; develop and/or critique a natural resources management plan. i. Apply mathematical concepts and operations to perform natural resources management tasks. j. Explain scientific concepts (i.e., photosynthesis, climate change, evolution) as they relate to natural resources.

Program Technical Standards:	Standards for each career path build on and continue the Anchor Standards with more complexity, rigor, and career specificity.
3. Environmental Conservation	a. Apply best management practices for environmental conservation. b. Describe soil formation processes, soil erosion, and nutrient cycling. c. Explain air and water use, their management practices, and conservation strategies. d. Describe the water cycle and ecological issues associated with water quality, including surface water runoff. e. Explain the practices of solid and hazardous waste management. f. Describe outdoor recreation activities and recreational environment management. g. Identify public and private land use issues; develop and propose solutions.
4. Business Management	a. Produce, harvest, process, and market timber products. b. Identify and apply general business and management skills. c. Develop a business plan and identify sources of credit. d. Maintain financial and technical record keeping systems.
5. Communication	a. Demonstrate effective verbal and written communication skills in the natural resources classroom, laboratory, and work site.
6. Leadership and Teamwork	a. Demonstrate an ability to work independently and as a collaborative natural resources team member.
7. Ethics and Legal Responsibilities	a. Explain the professional and ethical standards that are required in natural resources.
8. Career Development	a. Identify and explore career options and pathways in the field of natural resources, as well as required training and certification processes.

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Graduation Proficiencies:	Indicators:
English Language Arts	High School 1. **Reading**: b, c, d, g 2. **Writing**: a, b, d, e 3. **Writing**: c 4. **Speaking and Listening**: a, b, d 5. **Speaking and Listening**: a, b, d 6. **Language**: a, c, e
Mathematics	High School 1. **Modeling**: a, b, c, d, e, f 2. **Number and Quantity**: c 5. **Geometry**: m, n 6. **Statistics and Probability**: a, c, e
Science	High School 3. **Life Sciences**: Structure, Function, and Information Processing: e 4. **Life Sciences**: Matter and Energy in Organisms and Ecosystems: b, c, d 7. **Earth and Space Sciences**: Earth Systems: b, d, e, h, i 8. **Engineering, Technology, and Application of Science**: a, b, e
Global Citizenship/Social Studies	End of Gr. 12 **Inquiry**: Constructing compelling and supporting questions: a, d; Determining helpful sources: a **Civics**: Processes, Rules, and Laws: a **Economics**: Exchange and Markets: a **Geography**: Human Environment Interaction: Place, Regions, and Culture: a; Human Population: Spatial Patterns and Movement: a **Communicating Conclusions and Taking Informed Action**: Communicating: b
Physical Education	High School 1. **Knowledge and Motor Skills**: a, b 4. **Affective Qualities and Social Interaction**: b, d

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Demonstration and Application:	Available Options:
Dual Enrollment/Fast Forward Courses	**CCV:** Intro to Environmental Science (ENV-1010), Intro to Business (BUS-1010-VC50), Startup 802: An Entrepreneurial Mindset (BUS-1125-VC50) **VTC:** Burls to Boards (AGR 1061), Intro to Horticulture (LAH 1020) **White Mountains Community College:** Dendrology (FRST 101W), Intro to Environmental Studies (ENVS 110W), Intro to Forestry Resources (FRST 205W)
Industry Recognized Credentials (IRCs)	**Tier 1:** - American Heart Association - CPR or CPR/AED - American Heart Association - First Aid - American Heart Association - First Aid, CPR/AED - American Red Cross - CPR/AED - American Red Cross - First Aid - American Red Cross - First Aid, CPR/AED - National Safe Tractor and Machinery Operation Program - OSHA 10 - Scuba Diving Certification - Tree Climbing for Arborists - Wilderness First Aid - Wilderness Fire Training **Tier 2:** - Federal Aviation Administration (FAA) - Part 107 Remote Pilot Certification (Drones) - iCEV - Ducks Unlimited Ecology Conservation & Management Certification - Northeast Woodland Training - Game of Logging - Levels 1 through 4 (all 4 required) - Vermont Logger Education to Advance Professionalism/VT LEAP - LEAP Sustainable Forestry Initiative (SFI) Certification - SOLO - Wilderness First Responder - SOLO - Wilderness EMT - ACT National Career Readiness Certificate - Levels 5, 6, or 7

Demonstration and Application:	Available Options:
National Career Technical Student Organizations (CTSOs)	- SkillsUSA - Future Farmers of America (FFA)
Work-Based Learning/Co-op (WBL)	Varies by CTE Center
Entrepreneurship Opportunities	Varies by CTE Center
Portfolio/Personalized Learning Plan (PLP)	Varies by CTE Center

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