
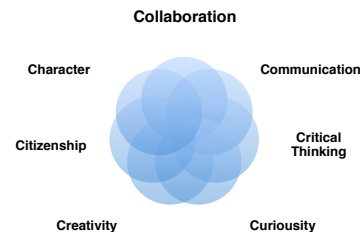


	Course: Sustainable Food Production Year A	
	R14 The Seven Cs of Learning 	
Unit Titles	Length of Unit	
• <i>Aquaponics and Garden management</i>	6-8 Weeks	
• <i>Aquatic Ecosystems and Biology</i>	4-6 Weeks	
• <i>Shellfisheries and Coastal Ecosystems</i>	3-5 Weeks	
• Supervised Agricultural Experience (SAE) Proficiencies	1-2 Weeks	
• <i>Forest Foods</i>	4-6 weeks	
• <i>Garden Planning</i>	4-6 weeks	
• <i>Local Fisheries</i>	3-5 weeks	



Strands	Course Level Expectations
Maintenance and Safety	Students will be responsible for managing the greenhouses where they will use basic woodworking, plumbing, and hand tools. In addition, students need to come physically prepared to perform fieldwork in all weather conditions. They will manage the garden and greenhouse in hot conditions, monitor fish systems where they will get wet and dirty, and walk throughout the facilities in the wintertime.
Water	Water management is a constant throughout this course. Knowing how to manage water parameters will ensure aquatic species health and production, as well as maximize crop yields
Aquatic Biology	Aquatic species are a key component of this course. Understanding their anatomy and physiology will help in their management and preservation.
Food Production	One of the primary goals of this course is to produce as much food as possible using the best sustainable agricultural practices.

Unit Title	Aquaponics and Garden Management	Length of Unit	6-8 weeks
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Inquiry Questions (Engaging & Debatable)	<ul style="list-style-type: none"> • How can aquaponics be used as a method of sustainable food production? • What equipment is used in aquaponics and land based farming? • What important management factors apply to aquaculture, hydroponics, and gardening?
Standards*	<p>Aquaponics and Environmental Service Systems:</p> <p>Performance Element: FPP.02. Apply safety principles, recommended equipment and facility management techniques to the food products and processing industry.</p> <p>CT-AQ.07.03.02.a. Identify equipment and handling facilities used in modern aquaculture production. CT-AQ.07.03.03.a Identify and describe the following parts of a recirculating aquaculture system (RAS): tank, sump or reservoir, pump, solid waste filter, U/V sterilizer, heat exchanger, bio-filter, and aeration.</p> <p>CT-AQ.07.03.03.b. Explain the basic electrical, plumbing and mechanical components of aquaponic systems. ESS.03.03.02.a. Examine and summarize how chemistry affects water quality and function (e.g., oxygen saturation, pH, biomagnification, etc.).</p> <p>CT-AQ.12.01.05.b. Explain how aquaponics can be utilized to enhance sustainable aquaculture practices by reducing water consumption and waste production.</p>
Unit Strands & Concepts	Identify and Operate Various Tools, Principles of Crop Production, Knowing and Making Recirculating Aquaculture Systems, Tool use, tractor and machinery use, recirculating aquaculture, gardening techniques, hydroponics, sustainability
Key Vocabulary	Recirculating, aquaculture, systems, hydroponics, sustainable, aquaponics,

The agriculture, food and natural resources (AFNR) industry standards

Unit Title	Aquaponics and Garden Management	Length of Unit	3-5 Weeks
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Critical Content: My students will Know ...	Key Skills: My students will be able to (Do) ...
<ul style="list-style-type: none"> • ways to identify tools and equipment • principles of crop production and fish health • components of recirculating aquaculture systems • the definition of sustainable agriculture 	<ul style="list-style-type: none"> • operate power tools and garden machinery • create and maintain their own aquaponic systems • identify and maintain optimum water quality conditions for fish and plant production • explain how aquaponics can be used to address global food shortages • troubleshoot and maintain recirculating aquaculture systems • troubleshoot and maintain hydroponic systems

Assessments:	<ul style="list-style-type: none"> • Formative assessment on greenhouse/garden terminology • Performance Assessment • Summative Assessment
Teacher Resources:	❖ Various Primary Resources

Unit Title	Aquatic Ecosystems and Biology	Length of Unit	5-7 weeks
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Inquiry Questions (Engaging & Debatable)	<ul style="list-style-type: none"> • What are the components of aquatic ecosystems? • What are common fish species in the freshwater aquaculture and fisheries industries? • How do we maintain and harvest fish? • What are the anatomies of finfish and shellfish?
Standards	<p>Aquaponics (AQ) and Environmental Service Systems (ESS):</p> <p>CT-AQ.08.02.01.a. Identify optimal environmental conditions for aquatic species.</p> <p>CT-AQ.05.01.01.a. Compare and contrast common types of feedstuffs and the roles they play in the diets of aquatic animals.</p> <p>CT-AQ.03.01.01.a. Identify the following external morphological features of a finfish: dorsal, pectoral, pelvic, anal, caudal and adipose fins, lateral line, and operculum.</p> <p>CT-AQ.03.01.01.b. Identify the following external morphologic features of a crustacean: carapace, abdomen, walking legs, and claws. . * CT Assessment Standard, AQ 13.</p> <p>CT-AQ.03.01.01.c. Explain how the components and systems of aquatic species anatomy and physiology relate to the production and use of aquatic species.</p> <p>ESS.03.03.02.a. Examine and summarize how chemistry affects water quality and function (e.g., oxygen saturation, pH, biomagnification, etc.).</p>
Unit Strands & Concepts	Aquatic Ecosystems and Interaction, Optimal Living Conditions, Fish Health, Fish Anatomy and Physiology, Aquatic Food Webs, fish Identification, Fish Feeds,
Key Vocabulary	Fish anatomy, shellfish anatomy, nitrification, filtration, aeration, phytoplankton, zooplankton, benthic macroinvertebrates

Unit Title	Aquatic Ecosystems and Biology	Length of Unit	5-7 Weeks
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Critical Content: My students will Know ...	Key Skills: My students will be able to (Do) ...
<ul style="list-style-type: none"> • basic anatomy of finfish and shellfish • common fish species in the aquaculture and fisheries industries • important components of fish feeds • parts of aquatic food webs 	<ul style="list-style-type: none"> • identify and describe internal and external fish parts • describe optimal living conditions for various fish growouts • raise and harvest a fish at market size • identify benthic macroinvertebrates • describe the components of aquatic ecosystems and how they affect one another

Assessments:	<ul style="list-style-type: none"> • Formative Assessment on Aquatic Biology Vocabulary • Performance Assessment • Summative Assessment
Teacher Resources:	<ul style="list-style-type: none"> ❖ Various Primary Resources ❖ Parker, Rick. <u>Aquaculture Science</u>. 2nd Edition. Delmar Publishers Inc. 2002

Unit Title	Shellfisheries and Coastal Ecosystems	Length of Unit	3-5 weeks
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Inquiry Questions (Engaging & Debatable)	<ul style="list-style-type: none"> • How is shellfish production a method of sustainable agriculture? • What are shellfisheries' effects on coastal ecosystems? • How are saltwater ecosystems different than freshwater ecosystems? • What is the importance of the shellfish industry in Connecticut/New England?
Standards	Aquaponics (AQ): CT-AQ.04.01.03.b. Evaluate the health and productivity of fish and shellfish populations. CT-AQ.04.02.01.a. Explain the importance of biosecurity to the aquaculture industry.
Unit Strands & Concepts	Understanding Shellfish Production Equipment, Water Quality Parameters, Life Processes of Shellfish, shellfish anatomy and physiology, shellfish contamination, economics of Connecticut shellfisheries
Key Vocabulary	Shellfish, fecal coliform, ocean acidification, dredge

Unit Title	Shellfisheries and Coastal Ecosystems	Length of Unit	3-5 weeks
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Critical Content: My students will Know...	Key Skills: My students will be able to (Do)...
<ul style="list-style-type: none"> the value and importance of the CT shellfish industry basic anatomical features of various species of shellfish the components of saltwater ecosystems how shellfish are cultivated in captivity the effects of the environment on shellfish populations 	<ul style="list-style-type: none"> identify species of shellfish describe life processes of clams and oysters identify equipment used in nursery and field production of oysters and clams describe water quality parameters specific to shellfish

Assessments:	<ul style="list-style-type: none"> Formative Assessments CT Shellfisheries Building and Facilities Unit Summative Assessment
Teacher Resources:	❖ Various Primary Resources

Unit Title	SAE Proficiencies	Length of Unit	1-2 weeks
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Inquiry Questions (Engaging & Debatable)	<ul style="list-style-type: none"> • How does record keeping relate to evaluation of goals? • How does a student quality growth? • How does a student describe and document success?
Standards	<p>CCTC Career Ready Practices (CRP) :</p> <p>CRP.01. Act as a responsible and contributing citizen and employee. CRP.01.01. Model personal responsibility in the workplace and community CRP.01.02 Evaluate and consider the near-term and long-term impacts of personal and professional decisions on employers and community before taking action. CRP.01.03. Identify and act upon opportunities for professional and civic service at work and in the community.</p> <p>CRP.02. Apply appropriate academic and technical skills. CRP.02.01. Use strategic thinking to connect and apply academic learning, knowledge and skills to solve problems in the workplace and community. CRP.02.02. Use strategic thinking to connect and apply technical concepts to solve problems in the workplace and community.</p>
Unit Strands & Concepts	Financial Reporting, how to prepare and Present, Effective Writing, How to Determine Success Record keeping, Descriptive writing, Evaluation of goals and success,
Key Vocabulary	Proficiency, financial report, income, expenses, career success, placement, scope, expenditures, gross earnings, net earnings, liabilities, net worth

Unit Title	SAE Proficiencies	Length of Unit	1-2 Weeks
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Critical Content: My students will Know ...	Key Skills: My students will be able to (Do) ...
<ul style="list-style-type: none"> • utilize AET • describe and explain the student's' SAE • calculate hours worked and money earned • list skills and identify growth • calculate gross and net income • evaluate goals 	<ul style="list-style-type: none"> • create a comprehensive PowerPoint presentation • create a expense report and earning report • write descriptive paragraphs • assemble a collage • create a professional resume • describe and quality success

Assessments:	<ul style="list-style-type: none"> • Formative and Interim Assessments • Summative: Final Submission of Proficiency Application. Grades with the National FFA rubric • Performance Assessment: SAE Multimedia Presentation
Teacher Resources:	❖ Various Primary and Industry Resources

Unit Title	Forest Foods	Length of Unit	4-6 weeks
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Inquiry Questions (Engaging & Debatable)	<ul style="list-style-type: none"> • What foods can be harvested from wooded areas in the Northeast United States? • How is maple syrup produced? • How are shiitake mushrooms produced?
Standards	<p>Natural Resource Systems (NRS):</p> <p>NRS.01 Performance Element: Explain interrelationships between natural resources and humans necessary to conduct management activities in natural environments.</p> <p>CT-NRS.01.01.02.a. Describe morphological characteristics used to identify trees and other woody plants, herbaceous plants, wildlife and aquatic species native to New England.</p> <p>NRS.02 Performance Element: Apply scientific principles to natural resources management activities. Demonstrate safety practices when working in an outdoor environment.</p> <p>NRS.03 Performance Element: Apply knowledge of natural resources to production and processing industries.</p> <p>Process forest products.</p>
Unit Strands & Concepts	Identifying and Understanding Hardwood Trees, Knowing Fungi and Its importance, Tap and Process Maple Sugar, Maple syrup production, foraged foods, chainsaw operation, tree identification, shiitake mushroom production
Key Vocabulary	Viscosity, brix, sap, hydrometer, morel, fiddlehead, mycelium, inoculation

Unit Title	Forest Foods	Length of Unit	4-6 Weeks
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Critical Content: My students will Know ...	Key Skills: My students will be able to (Do) ...
<ul style="list-style-type: none"> • how to identify hardwood tree species relevant to this unit • the anatomy and reproduction of fungi and their role in agriculture • the operational components of a chainsaw • equipment related to the production of maple syrup • habitats that morel mushrooms and fiddleheads prefer 	<ul style="list-style-type: none"> • properly tap sugar maple trees • correctly process sap into maple syrup • safely operate chainsaws • inoculate hardwood trees with shiitake mushroom spawn • identify morel mushrooms and fiddleheads with 100% accuracy

Assessments:	<ul style="list-style-type: none"> • Fungi Assessment • Performance Assessment • Unit Summative Assessment
Teacher Resources:	❖ Various Primary Resources

Unit Title	Local Fisheries	Length of Unit	3-5 weeks
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Inquiry Questions (Engaging & Debatable)	<ul style="list-style-type: none"> • What is the importance of the recreational fishing industry in CT? • What types of facilities are used to raise fish for recreational purposes? • What species of fish are the most important to the recreational fishing industry? • How is recreational fishing conducted?
Standards	<p>Natural Resource Systems (NRS): NRS.02.03.01.c. Develop predictions for how the management, protection, enhancement and improvement of natural resources will evolve through social considerations (e.g., establishment of national parks, public opinion, and fishing, reduction of waste and energy consumption, etc.). CT-NRS.02.04.01.a. Describe how laws can be used as a fish and wildlife management technique in New England.</p>
Unit Strands & Concepts	Recreational Fish Stocking, Licensing, Using a Fly Fishing Rod, Fly tying, Trout Raceways and Facilities, Equipment Used at Hatcheries and Growout Facilities, Salmonids Growth Cycle, The Wild Habitat and Feeding of Salmonid
Key Vocabulary	raceway, growout facility, hatchery, tying vice, fly rod, milt

Unit Title	Local Fisheries	Length of Unit	3-5 Weeks
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Critical Content: My students will Know ...	Key Skills: My students will be able to (Do) ...
<ul style="list-style-type: none"> • fishing rules and regulations that apply in Connecticut • the process by which salmonids are raised from egg to adult • wild habitat and feeding habits of salmonid 	<ul style="list-style-type: none"> • identify common species of trout and salmon stocked in Connecticut • identify equipment used at hatcheries and growout facilities • tie flies used in recreational fishing • prepare and use a fly fishing rod

Assessments:	<ul style="list-style-type: none"> • Fly Tying Demo • Summative Unit Assessment
Teacher Resources:	❖ Various Primary Resources