Board/Authority Authorized Course Framework Template

School District/Independent School Authority Name: School District 33	School District/Independent School Authority Number (e.g. SD43, Authority #432): SD33
Developed by: Joe Massie and Tania Toth	Date Developed: November 27, 2019
School Name: Sardis Secondary School	Principal's Name: Dan Heisler
Superintendent Approval Date (for School Districts only):	Superintendent Signature (for School Districts only):
Board/Authority Approval Date:	Board/Authority Chair Signature:
Course Name: Sustainable Vegetable Production 12	Grade Level of Course: 12
Number of Course Credits: 4	Number of Hours of Instruction: 80

Board/Authority Prerequisite(s):

None

Special Training, Facilities or Equipment Required:

Sardis Secondary Greenhouse and Sardis Secondary Farm

Course Synopsis:

This course is a continuation to Sustainable Vegetable Production 10 and 11. Students will be expected to become proficient in the concepts of sustainable practices in agriculture. This unique outdoor course will take place at both the Sardis Secondary School Greenhouse and the Sardis Secondary School Farm (on Richardson Avenue). Students will be taught about food production through practical hands-on experiences. Students will learn skills in land preparation, planting, weed control, pest management, fertilizing, pruning, harvesting, marketing and sales. They will also work alongside community partners who are specialists in the various commodities grown. As a side

benefit, students will be consumers of the various foods grown and will be encouraged to prepare the food and eat it with their families. Students will be able to learn culinary skills.

Goals and Rationale:

- develop an understanding and appreciation of the nature of science as an evidence-based way of knowing the natural world that yields descriptions and explanations, which are in turn continually being improved within the context of our cultural values and ethics
- develop place-based knowledge of the natural world and experience the local area in which they live by accessing and building on existing understandings, including those of First Peoples
- develop a solid foundation of conceptual and procedural knowledge in science that they can use to interpret the natural world and apply to new problems, issues, and events; to further learning; and to their lives
- develop the habits of mind associated with science – a sustained curiosity; a valuing of questions; an openness to new ideas and consideration of alternatives; an appreciation of evidence; an awareness of assumptions and a questioning of given information; a healthy, informed skepticism; a seeking of patterns, connections, and understanding; and a consideration of social, ethical, and environmental implications
- develop a lifelong interest in science and the attitudes that will make them scientifically literate citizens who bring a scientific perspective, as appropriate, to social, moral, and ethical decisions and actions in their own lives, culture, and the environment

Aboriginal Worldviews and Perspectives:

- Learning ultimately supports the well-being of the self, the family, the community, the land, the spirits, and the ancestors.
- Learning is holistic, reflexive, reflective, experiential, and relational (focused on connectedness, on reciprocal relationships, and a sense of place).
- Learning involves patience and time.
- Learning requires exploration of one's identity.

Course Name: **Grade:**

BIG IDEAS

Complex roles and relationships contribute to diversity of ecosystems; changes to this can be caused by humans or nature.	Human practices affect the sustainability of ecosystems; thus, sustainability is essential to human survival.	Water is essential to life; therefore, its conservation is required.	Soil health is essential for healthy ecosystems and food development; therefore, humans need to protect it.	Life is a result of interactions at the molecular and cellular levels.

Learning Standards

Curricular Competencies	Content
Students are expected to do the following: **Questioning and predicting** •Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal, local, or global interest •Make observations aimed at identifying their own questions, including increasingly abstract ones, about the natural world •Formulate multiple hypotheses and predict multiple outcomes •Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative) •Assess risks and address ethical, cultural, and/or environmental issues associated with their proposed methods •Use appropriate SI units and appropriate equipment, including digital technologies, to systematically and accurately collect and record data **Processing and analyzing data and information** •Experience and interpret the local environment •Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information	*Students are expected to know the following:* ♦ Ecosystem complexity: • roles • relationships • population dynamics • succession • biotic diversity • ecosystem services – ex. pollination • water quality parameters and bioindicators • soil characteristics • essential nutrients • abiotic characteristics ♦ Energy and matter flow through ecosystems ♦ Human actions and their impact on ecosystem integrity • resource stewardship • restoration practices • sustainable food production using IPM • land management

- Seek and analyze patterns, trends, and connections in data, including describing relationships between variables, performing calculations, and identifying inconsistencies
- Use knowledge of scientific concepts to draw conclusions that are consistent with evidence
- Analyze cause-and-effect relationships

Evaluating

- Evaluate their methods and experimental conditions, including identifying sources of error or uncertainty, confounding variables, and possible alternative explanations and conclusions
- Describe specific ways to improve their investigation methods and the quality of their data
- Evaluate the validity and limitations of a model or analogy in relation to the phenomenon modelled
- Demonstrate an awareness of assumptions, question information given, and identify bias in their own work and in primary and secondary sources
- Consider the changes in knowledge over time as tools and technologies have developed
- Connect scientific explorations to careers in science
- Exercise a healthy, informed skepticism and use scientific knowledge and findings to form their own investigations to evaluate claims in primary and secondary sources
- Consider social, ethical, and environmental implications of the findings from their own and others' investigations
- Critically analyze the validity of information in primary and secondary sources and evaluate the approaches used to solve problems
- Assess risks in the context of personal safety and social responsibility

Applying and innovating

- Contribute to care for self, others, community, and world through individual or collaborative approaches
- Co-operatively design projects with local and/or global connections and applications

    - personal choices and sustainable living
    - food literacy
    - availability and water use impacts
    - conservation of water
- ♦ levels of biotic diversity
    - sexual and asexual reproduction
    - unicellular and multi-celled organisms
    - interactions between organisms
- ♦ First Peoples knowledge
    - classification
    - traditional ecological knowledge in sustaining biodiversity
    - interrelationships between organisms

• Contribute to finding solutions to problems at a local and/or global level through inquiry • Implement multiple strategies to solve problems in real-life, applied, and conceptual situations • Consider the role of scientists in innovation Communicating • Formulate physical or mental theoretical models to describe a phenomenon • Communicate scientific ideas and information, and perhaps a suggested course of action, for a specific purpose and audience, constructing evidence-based arguments and using appropriate scientific language, conventions, and representations • Express and reflect on a variety of experiences, perspectives, and worldviews through place	

Big Ideas – Elaborations

- **Diversity and changes of ecosystems:**

Sample questions to support inquiry with students:
— What are the roles and relationships in the local ecosystem of a sustainable garden?
— How do some of the roles and relationships in ecosystems contribute to biodiversity?
— Why is diversity an important feature of sustainable ecosystems?
— How does farming change ecological processes?
— How has the ecosystem at the school farm changed over time?
— How do energy and matter move through the ecosystem of a sustainable garden?

- **Sustainability of ecosystems and land use:**

Sample questions to support inquiry with students:
— How do human actions affect the sustainability of an ecosystem? How do your actions affect the sustainability of your local ecosystem?
— How do First Peoples traditional practices contribute to dynamic equilibrium in an ecosystem?
— How do healthy ecosystems influence the well-being of humans?
— How are your decisions around personal food consumption linked to global food security?
— How does crop rotation affect nitrogen levels in soil?

- **Importance of water to life and farming:**

Sample questions to support inquiry with students:
— How do human actions affect the sustainability of our water availability and quality?
— How do can humans lower the impact of water use in farming?
— How can farming practices affect the water quality and lead to ecological issues?

- **Importance of soil to life and farming:**

Sample questions to support inquiry with students:
— How do human actions affect the health of the soil?
— How can soil be amended?
— What type of soil is located at the farm? There are areas that have never been amended, what is the original soil at the farm?
— How does healthy soil influence the wellbeing of plants? And how does this translate in to the wellbeing of animals?
— What do we add to the soil in order to replace components that plants have used?

- **Cellular interactions:**

Sample questions to support inquiry with students:
— How do cells multiply?
— How do unicellular and multicellular organisms interact for the betterment or detriment of an ecosystem?

— What are the advantages and disadvantages of sexual and asexual reproduction?

Curricular Competencies – Elaborations

• Questioning and predicting:
Sample opportunities to support student inquiry:
— What is the level of biodiversity at the school farm?
— What type of human activities has an ecosystem of the school farm sustained over the years?
— Which of your actions and decisions do you think influence your ecological footprint?
— How detrimental are invasive plants at the school farm?
• Planning and conducting:
Sample opportunities to support student inquiry:
— How can we measure the level of biodiversity at the school farm?
— How would you gather data about the human activities that have shaped your local environment, especially as it pertains to farming?
— What tools and technologies can you use to create a sustainable farm plan?
— How would you gather data on the population size and distribution of an invasive species and native species?
• Processing and analyzing data and information:
Sample opportunities to support student inquiry:
— What is the relationship between soil quality and biodiversity at a sustainable garden?
— How does traditional tilling compare with no-till in terms of soil biodiversity?
• **Evaluating**:
Sample opportunities to support student inquiry:
— What other factors, besides biodiversity, can be considered to determine the overall health of the school farm?
— How does the use of sustainable methods contribute to the health of the farm ecosystem? Does traditional ecological knowledge (TEK) align with them?
• Applying and innovating:
Sample opportunities to support student inquiry:
— What kind of changes can be made to improve the biodiversity of a sustainable garden?
— How can traditional ecological knowledge (TEK) inform future sustainable practices at the school farm?
— How can you both directly and indirectly reduce your family's ecological footprint (eat local?)?
— How can you engage in a local ecosystem restoration project?
• Communicating:
Sample opportunities to support student inquiry:
— How can your findings be used to advocate for the importance of eating locally?
— How can you share your findings about your ecological footprint with local community groups?
— How might you motivate others to reduce their ecological footprint?
— How can you share with others what you have learned from your experience growing local, sustainable food?

Content – Elaborations

- Ecosystem complexity: Students will become proficient in the following points about a polyculture farm ecosystem
  - Roles of pollinators and flowering plants, plants and animals
  - Relationships that humans have with pollinators and food
  - population dynamics of pests and beneficial organisms in food crops
  - successive changes the ecosystem over the growing season
  - biotic diversity is essential in sustainable food management and disease control
  - ecosystem services – ex. Pollination, energy levels, habitat, symbiotic relationships, nitrogen-fixing plants
  - water quality parameters
  - bioindicators in the sense of irrigation requirements
  - water management and plants that indicate poor soil quality or moisture levels, aka weeds
  - soil characteristics, such as, sand, silt, clay, organic material, soil amendment
  - essential nutrients for plant growth
  - soil preparation for plants
  - abiotic characteristics, such as, nutrients, light, water, and atmosphere requirements for growing food
- Energy and matter flow through ecosystems: Students will become proficient in energy flow and matter flow through growing and eating produce from the Sardis Secondary School Farm.
- Human actions and their impact on ecosystem integrity: Students will become proficient in sustainable practices in food production in the following areas.
  - resource stewardship – learning how to care for plants and animals (birds in the barn)
  - restoration practices - learning how to amend soil and lower our impact in excess fertilizer use
  - sustainable food production using IPM – learn to use ecological and environmentally friendly methods for food production and pest management.
  - land management – learn to use the land in an efficient way by practicing crop rotation and soil amendment practices
  - personal choices and sustainable living
  - students will use the food that is grown to prepare meals with their families, living within a 20-mile diet and increasing their vegetable consumption.

Content – Elaborations

- Students will understand food literacy
- students will learn about food production
- food preparation skills both at the farm and at home
- availability and water use impacts – students will learn about low flow irrigation and water waste reduction in agriculture
- conservation of water – students will learn about current irrigation technology that prevents water wasting and runoff

♦ Levels of biotic diversity – Students will become proficient in reproductive methods of plants and animals (birds in barn) using the Sardis Secondary School Farm and Greenhouse, as well as, the chickens in the barn.

- sexual and asexual reproduction – students will sow seeds for crops at the farm, they will perform division of bulb plants such as garlic and tulips.
- Students will learn about alternative forms of plant roots, such as tubers, bulbs, rhizomes. They will learn about sexual reproduction through our mating chickens.
- Students will work with unicellular and multi-celled organisms
- Students will demonstrate understanding that life is connected to life and to the Earth
- Students will learn about Kingdom Plantae and Kingdom Animalia through the Sardis Secondary School Farm and GH and Barn

♦ First Peoples knowledge – Students will become proficient in how First Nations People know plants in the following ways.

- Classification – Students will learn how to classify plants as food or medicine.
- traditional ecological knowledge in sustaining biodiversity - students will learn about agriculture, enthnobotany, selective harvesting and harvesting cycles
- Interrelationships between organisms – students will learn that organisms are all connected and that we are connected to organism.
- Students will learn that all organism are connected to the land, water, and air.

Content – Elaborations

Recommended Instructional Components:

- Access to a Greenhouse
- Access to a Farm - Polyculture
- Access to Bees

Recommended Assessment Components: Ensure alignment with the Principles of Quality Assessment

Assessment as learning:

- feedback and opportunities to display understanding and make improvements to understanding
- Practical skills assessments

Assessment for learning:

- dialogic approach to learning
- Hands on approach

Assessment of learning:

- Hands on practices
- Final project reflecting learning in competencies and content

Learning Resources:

- Growing Guides
- Integrated Pest Management Guides

Additional Information:

We are looking for keen students with an interest in the outdoors, growing food and working with their hands. Students will work under the instruction of Agriculture Teachers (Mr. Massie and Ms. Toth) at two locations. At the SSS Greenhouse you will be growing tomatoes, cucumbers and peppers using hydroponic growing systems. We will also spend time at the new SSS Farm on Richardson Avenue growing a variety of field crops such as corn, pumpkins, potatoes, and many more. You will learn to use a variety of equipment and perform a wide array of jobs involved in producing food. We will be selling the food as a fund-raiser for the SSS Agriculture program. ***You can also expect the chance to EAT a lot of delicious food and take food home to your families as well!***