Crosswalk Between: *Wisconsin's Model Academic Standards for Science* and
Wisconsin's Model Academic Standards for Agricultural Education
PLANT SCIENCE
FORT ATKINSON HIGH SCHOOL – FORT ATKINSON, WI
180 days (1 year)

Instructions: Please fill out the third column illustrating how the proposed agriculture class meets the state standards in the first two columns. Information in the third column should include knowledge, concepts and skills, and a summery of the equivalent instructional time for the equivalent course. The first column lists Wisconsin's Model Academic Standards for Science. Column two illustrates the various agriculture performance standards that have been crosswalked to the science performance standards in the first column.

A. SCIENCE CONNECTIONS	**Agricultural Education Standards**	**Crosswalk of Local School Curriculum**
Performance Standards	**Performance Standards**	
By the end of Grade 12 students will:	***By the end of Grade 12 students will:***	
A.12.1 Apply the underlying themes of science to develop defensible visions of the future	B.12.4 Access and use information for a class presentation about the impact of new technologies on the products manufactured and produced; e.g., biotechnology D.12.5 Describe how biotechnology can enhance food and fiber production D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources E.12.3 Explain the impact of climate change on existing agricultural systems E.12.4 Analyze practices used by farmers to reduce erosion and runoff to maintain soil fertility and productivity E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment	
A.12.2 Show how conflicting assumptions about science themes lead to different opinions and decisions about evolution, health, population, longevity, education, and use of resources, and show how these opinions and decisions have diverse effects on an individual, a community, and a country, both now and in the future	D.12.3 Understand how public policy affects the food, fiber, and ornamental plant industries D.12.4 Explore traditional and nontraditional food, fiber, and ornamental horticultural jobs/careers and identify the necessary skills, aptitudes, and abilities E.12.2 Analyze benefits, costs, and consequences of land use E.12.3 Explain the impact of climate change on existing agricultural systems E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment	
A.12.3 Give examples that show how partial systems, models, and explanations are used to give quick and reasonable solutions that are accurate enough for basic	A.12.2 Understand the variety, complexity, and size of the agricultural industry in the world B.12.1 Apply knowledge of technology to identify and	

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needs	solve problems D.12.1 Describe the global utilization of Wisconsin's food, fiber, and ornamental plant products	
A.12.4 Construct arguments that show how conflicting models and explanations of events can start with similar evidence	E.12.3 Explain the impact of climate change on existing agricultural systems E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment	
A.12.5 Show how the ideas and themes of science can be used to make real-life decisions about careers, work places, life-styles, and use of resources	B.12.5 Explore various career opportunities in the food, fiber, and natural resources industries using available forms of technology D.12.4 Explore traditional and nontraditional food, fiber, and ornamental horticultural jobs/careers and identify the necessary skills, aptitudes, and abilities F.12.4 Research a career in agricultural business marketing and management	1. Exploring the Horticulture and Plant Science Fields – size & scope, job descriptions, working conditions
A.12.6 Identify and replace inaccurate personal models and explanations of science-related phenomena using evidence learned or discovered	D.12.5 Describe how biotechnology can enhance food and fiber production E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment	
A.12.7 Re-examine the evidence and reasoning that led to conclusions drawn from investigations, using the science themes	E.12.1 Understand the application of agricultural technologies that can sustain production while reducing environmental impact E.12.4 Analyze practices used by farmers to reduce erosion and runoff to maintain soil fertility and productivity	
B. NATURE OF SCIENCE	**Agricultural Education Standards**	**Crosswalk of Local School Curriculum**
Performance Standards	**Performance Standards**	
By the end of Grade 12 students will:	***By the end of Grade 12 students will:***	
B.12.1 Show how cultures and individuals have contributed to the development of major ideas in the earth and space,	C.12.1 Demonstrate a working knowledge of leadership and leadership styles	

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life and environmental, and physical sciences	D.12.1 Describe the global utilization of Wisconsin's food, fiber, and ornamental plant products D.12.3 Understand how public policy affects the food, fiber, and ornamental plant industries D.12.5 Describe how biotechnology can enhance food and fiber production E.12.4 Analyze practices used by farmers to reduce erosion and runoff to maintain soil fertility and productivity	
B.12.2 Identify the cultural conditions that are usually present during great periods of discovery, scientific development, and invention	D.12.3 Understand how public policy affects the food, fiber, and ornamental plant industries D.12.5 Describe how biotechnology can enhance food and fiber production	
B.12.3 Relate the major themes of science to human progress in understanding science and the world	D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber	
B.12.4 Show how basic research and applied research contribute to new discoveries, inventions, and applications	B.12.4 Access and use information for a class presentation about the impact of new technologies on the products manufactured and produced; e.g., biotechnology D.12.5 Describe how biotechnology can enhance food and fiber production D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources E.12.1 Understand the application of agricultural technologies that can sustain production while reducing environmental impact E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber	1. Understand the importance of research in science / agriculture and the impact of this research on plant science. 2. Develop testable questions in plant science that can be investigated. 3. Conduct safe investigations in plant science (botany) and communicate the results to others.
B.12.5 Explain how science is based on assumptions about the natural world and themes that describe the natural world	D.12.3 Understand how public policy affects the food, fiber, and ornamental plant industries E.12.3 Explain the impact of climate change on existing	

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	agricultural systems D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources	
C. SCIENCE INQUIRY	**Agricultural Education Standards**	**Crosswalk of Local School Curriculum**
Performance Standards	**Performance Standards**	
By the end of Grade 12 students will:	***By the end of Grade 12 students will:***	
C.12.1 When studying science content, ask questions suggested by current social issues, scientific literature, and observations of phenomena; build hypotheses that might answer some of these questions; design possible investigations; and describe results that might emerge from such investigations	B.12.1 Apply knowledge of technology to identify and solve problems C.12.2 Practice skills relating to communication, problem-solving, and decision-making through individual, group, and team processes	1. Understand the importance of research in science / agriculture and the impact of this research on plant science. 2. Develop testable questions in plant science that can be investigated. 3. Conduct safe investigations in plant science (botany) and communicate the results to others.
C.12.2 Identify issues from an area of science study, write questions that could be investigated, review previous research on these questions, and design and conduct responsible and safe investigations to help answer the questions	B.12.1 Apply knowledge of technology to identify and solve problems C.12.2 Practice skills relating to communication, problem-solving, and decision-making through individual, group, and team processes D.12.2 Discuss the impact that climate and water have on the food, fiber, and ornamental horticulture production cycles throughout the world D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources E.12.4 Analyze practices used by farmers to reduce erosion and runoff to maintain soil fertility and productivity E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment	1. Understand the importance of research in science / agriculture and the impact of this research on plant science. 2. Develop testable questions in plant science that can be investigated. 3. Conduct safe investigations in plant science (botany) and communicate the results to others.
C.12.3 Evaluate the data collected during an investigation, critique the data-collection procedures and results, and	B.12.1 Apply knowledge of technology to identify and solve problems	1. Understand the importance of research in science / agriculture and the impact of this research on plant

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suggest ways to make any needed improvements	B.12.3 Use technology to acquire, organize, and communicate information by entering, modifying, retrieving, and storing data C.12.2 Practice skills relating to communication, problem-solving, and decision-making	science. 2. Develop testable questions in plant science that can be investigated. 3. Conduct safe investigations in plant science (botany) and communicate the results to others.
C.12.4 During investigations, choose the best data-collection procedures and materials, use them competently, and calculate the degree of precision of the resulting data	B.12.1 Apply knowledge of technology to identify and solve problems B.12.3 Use technology to acquire, organize, and communicate information by entering, modifying, retrieving, and storing data C.12.2 Practice skills relating to communication, problem-solving, and decision-making	1. Understand the importance of research in science / agriculture and the impact of this research on plant science. 2. Develop testable questions in plant science that can be investigated. 3. Conduct safe investigations in plant science (botany) and communicate the results to others.
C.12.5 Use the explanations and models found in earth and space, life and environmental, and physical sciences to develop likely explanations for the results of their investigations	B.12.2 Select and communicate information in an appropriate format; e.g., oral, written, graphic, pictorial, multimedia C.12.2 Practice skills relating to communication, problem-solving, and decision-making	1. Understand the importance of research in science / agriculture and the impact of this research on plant science. 2. Develop testable questions in plant science that can be investigated. 3. Conduct safe investigations in plant science (botany) and communicate the results to others.
C.12.6 Present the results of investigations to groups concerned with the issues, explaining the meaning and implications of the results, and answering questions in terms the audience can understand	B.12.2 Select and communicate information in an appropriate format; e.g., oral, written, graphic, pictorial, multimedia B.12.4 Access and use information for a class presentation about the impact of new technologies on the products manufactured and produced; e.g., biotechnology C.12.2 Practice skills relating to communication, problem-solving, and decision-making	
C.12.7 Evaluate articles and reports in the popular press, in scientific journals, on television, and on the Internet, using criteria related to accuracy, degree of error, sampling, treatment of data, and other standards of experimental design	B.12.1 Apply knowledge of technology to identify and solve problems B.12.2 Select and communicate information in an appropriate format; e.g., oral, written, graphic, pictorial, multimedia C.12.2 Practice skills relating to communication, problem-solving, and decision-making	

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D. PHYSICAL SCIENCE	**Agricultural Education Standards**	**Crosswalk of Local School Curriculum**
Performance Standards	**Performance Standards**	
By the end of Grade 12 students will:	***By the end of Grade 12 students will:***	
Structures of Atoms and Matter		
D.12.1 Describe atomic structure and the properties of atoms, molecules, and matter during physical and chemical interactions	D.12.5 Describe how biotechnology can enhance food and fiber production D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources E.12.4 Analyze practices used by farmers to reduce erosion and runoff to maintain soil fertility and productivity E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment	
D.12.2 Explain the forces that hold the atom together and illustrate how nuclear interactions change the atom	No significant match found	
D.12.3 Explain exchanges of energy in chemical interactions and exchange of mass and energy in atomic/nuclear reactions	E.12.3 Explain the impact of climate change on existing agricultural systems E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment	

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Chemical Reactions		
D.12.4 Explain how substances, both simple and complex, interact with one another to produce new substances	D.12.5 Describe how biotechnology can enhance food and fiber production D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment	
D.12.5 Identify patterns in chemical and physical properties and use them to predict likely chemical and physical changes and interactions	D.12.5 Describe how biotechnology can enhance food and fiber production D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber	
D.12.6 Through investigations, identify the types of chemical interactions, including endothermic, exothermic, oxidation, photosynthesis, and acid/base reactions	D.12.5 Describe how biotechnology can enhance food and fiber production E.12.4 Analyze practices used by farmers to reduce erosion and runoff to maintain soil fertility and productivity E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment	
Motions and Forces		
D.12.7 Qualitatively and quantitatively analyze changes in the motion of objects and the forces that act on them and represent analytical data both algebraically and graphically	No significant match found	
D.12.8 Understand the forces of gravitation, the electromagnetic force, and the intermolecular force, and explain their impact on the universal system	No significant match found	
D.12.9 Describe models of light, heat, and sound and	D.12.5 Describe how biotechnology can enhance food and	

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through investigations describe similarities and differences in the way these energy forms behave	fiber production D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment	
Conservation of Energy and the Increase in Disorder		
D.12.10 Using the science themes, illustrate the law of conservation of energy during chemical and nuclear reactions	No significant match found	
Interactions of Matter and Energy		
D.12.11 Using the science themes, explain common occurrences in the physical world	D.12.2 Discuss the impact that climate and water have on the food, fiber, and ornamental horticulture production cycles throughout the world D.12.5 Describe how biotechnology can enhance food and fiber production D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources E.12.3 Explain the impact of climate change on existing agricultural systems E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment	1. Describe the function of water in the life of a plant. 2. Explain the meaning of the tem "water requirement" 3. Differentiate between the amount of water required by different species. 4. Describe the process of transpiration. 5. Identify the factors affecting the water requirement of plants
D.12.12 Using the science themes and knowledge of chemical, physical, atomic and nuclear interactions, explain changes in materials, living things, the earth's features, and stars	D.12.5 Describe how biotechnology can enhance food and fiber production D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources E.12.3 Explain the impact of climate change on existing agricultural systems E.12.5 Analyze the impact and use of chemicals in the	

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	production and processing of food and fiber	
E. EARTH AND SPACE SCIENCE	**Agricultural Education Standards**	**Crosswalk of Local School Curriculum**
Performance Standards	**Performance Standards**	
By the end of Grade 12 students will:	***By the end of Grade 12 students will::***	
Energy in the Earth System		
E.12.1 Using the science themes, distinguish between internal energies (decay of radioactive isotopes, gravity) and external energies (sun) in the earth's systems and show how these sources of energy have an impact on those systems	D.12.2 Discuss the impact that climate and water have on the food, fiber, and ornamental horticulture production cycles throughout the world. E 12.3 Explain the impact of climate change on existing agricultural systems	
Geochemical Cycles		
E.12.2 Analyze the geochemical and physical cycles of the earth and use them to describe movements of matter	D.12.2 Discuss the impact that climate and water have on the food, fiber, and ornamental horticulture production cycles throughout the world E 12.3 Explain the impact of climate change on existing agricultural systems	1. Describe the concept of soil texture and its importance. 2. Determine the texture of a soil sample. 3. Explain soil structure, its formation, and importance. 4. Differentiate various soil structures.
The Origin and Evolution of the Earth System		
E.12.3: Using the science themes, describe theories of the origins and evolution of the universe and solar system, including the earth system as a part of the solar system, and relate these theories and their implications to geologic time on earth	E.12.2 Analyze benefits, costs, and consequences of land use E.12.3 Explain the impact of climate change on existing agricultural systems. E.12.4 Anaylze practices used by farmers to reduce erosion and runoff to maintain soil fertility and productivity	
E.12.4 Analyze the benefits, costs, and limitations of past, present, and projected use of resources and technology and explain the consequences to the environment	B.12.4 Access and use information for a class presentation about the impact of new technologies on the products manufactured and produced; e.g., biotechnology D.12.5 Describe how biotechnology can enhance food and fiber production. D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources. E.12.1 Understand the application of agricultural	1. Describe the concept of soil texture and its importance 2. Determine the texture of a soil sample 3. Explain soil structure, its formation, and importance 4. Differentiate between types of soil structures 5. Demonstrate various means of water movement through the soil 6. Explain environment and issues related to the environment. 7. Explain how horticulture is beneficial to the

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	technolgies that can sustain production while reducing environmental impact. E.12.2 Analyze benefits, costs, and consequences of land use E.12.4 Anaylze practices used by farmers to reduce erosion and runoff to maintain soil fertility and productivity E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment.	environment. 8. Explain how horticulture can damage the environment. 9. Identify how natural resources can be affected by horticultural practices. 10. Identify how chemicals used in horticulture can affect the environment. 11. Explain the meaning of hydroponics and describe some of its advantages and disadvantages. 12. Describe the basic requirements for hydroponically grown plants. 13. Identify common hydroponic systems. 14. Prepare an overview of the production of hydroponically grown foods. 15. Explain the importance of soil testing and evaluation
The Origin and Evolution of the Universe		
E.12.5 Using the science themes, understand that the origin of the universe is not completely understood, but that there are current ideas in science that attempt to explain its origin	No significant match	
F. LIFE AND ENVIRONMENTAL SCIENCE	**Agricultural Education Standards**	**Crosswalk of Local School Curriculum**
Performance Standards	**Performance Standards**	
By the end of Grade 12 students will:	***By the end of Grade 12 students will:***	
The Cell		
F.12.1 Evaluate the normal structures and the general and special functions of cells in single-celled and multiple-celled organisms	B.12.4 Access and use information for a class presentation about the impact of new technologies on the products manufactured and produced; e.g., biotechnology D.12.5 Describe how biotechnology can enhance food and fiber production. D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources. E.12.1 Understand the application of agricultural technolgies that can sustain production while reducing environmental impact.	1. Examine the functions of roots in plants. 2. Identify the parts of a root. 3. Differentiate the two major types of root systems. 4. Evaluate the health of a root system. 5. Describe the functions of a stem. 6. Recognize the external structures of a stem. 7. Analyze the internal structures of a stem. 8. Distinguish between the different types of specialized stems 9. Distinguish between the purpose of the xylem and phloem

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		10. Describe the main parts of a leaf. 11. Compare common vein patterns found in leaves. 12. Examine how a leaf is organized. 13. Distinguish some major types of leaves. 14. Differentiate major leaf arrangements. 15. Describe the parts of a flower. 16. Explain the purpose of a flower. 17. List some different types of flowers. 18. Describe the functional difference between monocots and dicots. 19. Analyze the process of photosynthesis. 20. Examine the process of cellular respiration. 21. Describe plant growth processes. 22. Explain why photosynthesis and respiration are important to human beings. 23. Discuss the importance of plant propagation. 24. Explain the difference between sexual and asexual propagation. 25. Identify the major parts of a seed. 26. List the function of each major part of a seed 27. Discuss the importance of sexual propagation of plants. 28. Describe the process of seed germination. 29. Describe the factors involved in planting seeds for transplanting. 30. Explain how to successfully direct seed outdoors. 31. Report on why plants are propagated asexually. 32. Describe leaf and leaf-bud cuttings and how they are used to propagate plants. 33. Discern the three types of stem cuttings. 34. Explain how root cuttings are prepared for propagation. 35. Examine factors that determine the success of rooting of cuttings.

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		36. Explain separation and division. 37. Describe layering and identify four common forms of layering. 38. Explain separation and division. 39. Describe layering and identify four common forms of layering 40. Discuss the importance of tissue culture. 41. Name the nutrients needed for plant growth. 42. Explain why nutrients are essential to plants. 43. Explain where and how plants can obtain nutrients. 44. Describe environmental conditions that influence nutrient deficiencies. 45. Explain where plants can obtain nutrients if inadequate amounts are present in the soil. 46. Discuss the nitrogen cycle and its affect on plant nutrition
F.12.2 Understand how cells differentiate and how cells are regulated	D.12.5 Describe how biotechnology can enhance food and fiber production. E.12.1 Understand the application of agricultural technolgies that can sustain production while reducing environmental impact	
The Molecular Basis of Heredity		
F.12.3 Explain current scientific ideas and information about the molecular and genetic basis of heredity	D.12.5 Describe how biotechnology can enhance food and fiber production D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources. E.12.1 Understand the application of agricultural technolgies that can sustain production while reducing environmental impact	
F.12.4 State the relationships between functions of the cell and functions of the organism as related to genetics and heredity	D.12.5 Describe how biotechnology can enhance food and fiber production. D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have	1. Analyze the process of photosynthesis. 2. Examine the process of cellular respiration. 3. Describe plant growth processes. 4. Explain why photosynthesis and respiration are

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	on the food and fiber industries and natural resources. E.12.1 Understand the application of agricultural technolgies that can sustain production while reducing environmental impact	important to human beings. 5. Discuss the importance of plant propagation. 6. Explain the difference between sexual and asexual propagation. 7. Identify the major parts of a seed. 8. List the function of each major part of a seed 9. Report on why plants are propagated asexually. 10. Describe leaf and leaf-bud cuttings and how they are used to propagate plants. 11. Discern the three types of stem cuttings. 12. Explain how root cuttings are prepared for propagation. 13. Examine factors that determine the success of rooting of cuttings. 14. Explain separation and division. 15. Describe layering and identify four common forms of layering. 16. Discuss the importance of tissue culture.
Biological Evolution		
F.12.5 Understand the theory of evolution, natural selection, and biological classification	D.12.5 Describe how biotechnology can enhance food and fiber production. D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources.	1. Discuss the classification and naming of plants. 2. Distinguish the major groups of plants. 3. Contrast the classification of plants by life cycle
F.12.6 Using concepts of evolution and heredity, account for changes in species and the diversity of species, including the influence of these changes on science, e.g., breeding of plants or animals	D.12.5 Describe how biotechnology can enhance food and fiber production D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources E.12.1 Understand the application of agricultural technolgies that can sustain production while reducing environmental impact	1. Explain separation and division. 2. Describe layering and identify four common forms of layering 3. Discuss the importance of tissue culture.
The Interdependence of Organisms		

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F.12.7 Investigate how organisms both cooperate and compete in ecosystems	E.12.1 Understand the application of agricultural technolgies that can sustain production while reducing environmental impact E.12.2 Analyze benefits, costs, and consequences of land use E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment	
F.12.8 Using the science themes, infer changes in ecosystems prompted by the introduction of new species, environmental conditions, chemicals, and air, water, or earth pollution	D.12.2 Discuss the impact that climate and water have on the food, fiber, and ornamental horticulture production cycles throughout the world D.12.5 Describe how biotechnology can enhance food and fiber production D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources. E.12.1 Understand the application of agricultural technologies that can sustain production while reducing environmental impact E.12.2 Analyze benefits, costs, and consequences of land use E.12.3 Explain the impact of climate change on existing agricultural systems E.12.4 Analyze practices used by farmers to reduce erosion and runoff to maintain soil fertility and productivity E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment	1. Examine the effect of light on plants. 2. Describe a plant's temperature needs. 3. Explain how the quality of air affects plants. 4. Determine a plant's water needs
Matter, Energy, and Organization in Living Systems		
F.12.9 Using the science themes, investigate energy systems (related to food chains) to show how energy is stored in food (plants and animals) and how energy is released by digestion and metabolism	D.12.1 Describe the global utilization of Wisconsin's food, fiber, and ornamental plant products E.12.3 Explain the impact of climate change on existing agricultural systems	1. Discuss the structural unit in which photosynthesis takes place. 2. Describe the processes of photosynthesis. 3. Identify factors that affect photosynthesis.

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F.12.10 Understand the impact of energy on organisms in living systems	No significant match found	1. Discuss the structural unit in which photosynthesis takes place. 2. Describe the processes of photosynthesis. 3. Identify factors that affect photosynthesis.
F.12.11 Investigate how the complexity and organization of organisms accommodates the need for obtaining, transforming, transporting, releasing, and eliminating the matter and energy used to sustain an organism	D.12.1 Describe the global utilization of Wisconsin's food, fiber, and ornamental plant products D.12.2 Discuss the impact that climate and water have on the food, fiber, and ornamental horticulture production cycles throughout the world D.12.5 Describe how biotechnology can enhance food and fiber production. E.12.3 Explain the impact of climate change on existing agricultural systems	1. Discuss the structural unit in which photosynthesis takes place. 2. Describe the processes of photosynthesis. 3. Identify factors that affect photosynthesis. 4. Define cellular respiration. 5. Describe the processes of cellular respiration. 6. Identify factors that affect cellular respiration. 7. Define the types of growing media. 8. Describe the functions of the growing media. 9. Determine desirable properties of growing media. 10. Describe the components of soil. 11. Appraise the components of a soilless mix. 12. Evaluate the advantages and disadvantages of soilless medium 13. Explain how the resources soil provides help in supporting life. 14. Explain the contents of soil. 15. Describe the biological nature of soil. 16. Describe the four ways plants use soil. 17. Describe some agricultural uses of soil. 18. Describe some nonagricultural uses of soil. 19. Explain the soil profile. 20. Explain how soils within the profile change over time. 21. Distinguish between the major horizons of a soil profile.
The Behavior of Organisms		
F.12.12 Trace how the sensory and nervous systems of various organisms react to the internal and external environment and transmit survival or learning stimuli to	D.12.2 Discuss the impact that climate and water have on the food, fiber, and ornamental horticulture production cycles throughout the world	1. Define cellular respiration. 2. Describe the processes of cellular respiration. 3. Identify factors that affect cellular respiration.

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cause changes in behavior or responses	D.12.5 Describe how biotechnology can enhance food and fiber production E.12.3 Explain the impact of climate change on existing agricultural systems	4. Explain plant tropisms. 5. Identify the different tropisms affecting plant growth.
G. SCIENCE APPLICATIONS	**Agricultural Education Standards**	**Crosswalk of Local School Curriculum**
Performance Standards	**Performance Standards**	
By the end of Grade 12 students will:	***By the end of Grade 12 students will:***	
G.12.1 Identify personal interests in science and technology; account for implications that these interests might have for future education, and options to be considered	D.12.4 Explore traditional and nontraditional food, fiber, and ornamental horticultural jobs/careers and identify the necessary skills, aptitudes, and abilities B.12.5 Explore various career opportunities in the food, fiber, and natural resources industries using available forms of technology B.12.6 Access information identifying the postsecondary education programs, both in and outside of Wisconsin, leading to careers in the food, fiber, and natural F.12.4 Research a career in agricultural business marketing and management	
G.12.2 Design, build, evaluate, and revise models and explanations related to the earth and space, life and environmental, and physical sciences	D.12.2 Discuss the impact that climate and water have on the food, fiber, and ornamental horticulture production cycles throughout the world E.12.3 Explain the impact of climate change on existing agricultural systems E.12.4 Analyze practices used by farmers to reduce soil erosion and runoff to maintain soil fertility and productivity	
G.12.3 Analyze the costs, benefits, or problems resulting from a scientific or technological innovation, including implications for the individual and the community	A.12.2 Understand the variety, complexity, and size of the agricultural industry in the world A.12.3 Describe how global interdependence benefits the production and distribution of food and fiber B.12.1 Apply knowledge of technology to identify and solve problems B.12.4 Access and use information for a class presentation about the impact of new technologies on the products	1. Identify plant growth regulators (PGR) and their functions. 2. Explain plant tropisms. 3. Discuss synthetic growth regulators. 4. Describe commercial uses of plant growth regulators 5. Discuss the 16 essential nutrients, their functions, and deficiency symptoms. 6. Identify the non-fertilizer nutrients and their functions.

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	manufactured and produced; e.g., biotechnology D.12.5 Describe how biotechnology can enhance food and fiber production D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources E.12.1 Understand the application of agricultural technologies that can sustain production while reducing environmental impact E.12.2 Analyze benefits, costs, and consequences of land use E.12.4 Analyze practices used by farmers to reduce erosion and runoff to maintain soil fertility and productivity E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment	7. Identify the primary macronutrients and their functions, and deficiency symptoms. 8. Identify the secondary micronutrients and their functions, and deficiency symptoms. 9. Identify the micronutrients and their functions, and deficiency symptoms.
G.12.4 Show how a major scientific or technological change has had an impact on work, leisure, or the home	B.12.4 Access and use information for a class presentation about the impact of new technologies on the products manufactured and produced; e.g., biotechnology D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources	
G.12.5 Choose a specific problem in our society, identify alternative scientific or technological solutions to that problem and argue its merits	B.12.1 Apply knowledge of technology to identify and solve problems	
H. SCIENCE IN SOCIAL AND PERSONAL PERSPECTIVES	**Agricultural Education Standards**	**Crosswalk of Local School Curriculum**
Performance Standards	**Performance Standards**	
By the end of Grade 12 students will:	***By the end of Grade 12 students will::***	
H.12.1 Using the science themes and knowledge of the earth and space, life and environmental, and physical sciences, analyze the costs, risks, benefits, and	A.12.1 Identify how political policies and issues shape and influence food and fiber systems A.12.3 Describe how global interdependence benefits the	

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consequences of a proposal concerning resource management in the community and determine the potential impact of the proposal on life in the community and the region	production and distribution of food and fiber D.12.3 Understand how public policy affects the food, fiber, and ornamental plant industries cite examples of conflicts between environmentalists and producers of food and fiber E.12.1 Understand the application of agricultural technologies that can sustain production while reducing environmental impact E.12.2 Analyze benefits, costs, and consequences of land use E.12.3 Explain the impact of climate change on existing agricultural systems E.12.4 Analyze practices used by farmers to reduce erosion and runoff to maintain soil fertility and productivity E.12.5 Analyze the impact and use of chemicals in the production and processing of food and fiber E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment	
H.12.2 Evaluate proposed policy recommendations (local, state, and/or national) in science and technology for validity, evidence, reasoning, and implications, both short and long term	A.12.1 Identify how political policies and issues shape and influence food and fiber Systems B.12.1 Apply knowledge of technology to identify and solve problems C.12.2 Practice skills relating to communication, problem-solving, and decision-making through individual, group, and team processes D.12.3 Understand how public policy affects the food, fiber, and ornamental plant industries E.12.2 Analyze benefits, costs, and consequences of land use F.12.1 Describe how the production, distribution, and marketing of food and fiber is part of a complex economic system	

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H.12.3 Show how policy decisions in science depend on many factors, including social values, ethics, beliefs, and time-frames, and considerations of science and technology	A.12.1 Identify how political policies and issues shape and influence food and fiber systems B.12.1 Apply knowledge of technology to identify and solve problems D.12.3 Understand how public policy affects the food, fiber, and ornamental plant industries E.12.2 Analyze benefits, costs, and consequences of land use E.12.6 Analyze benefits, costs, and consequences of processing food and fiber on the environment F.12.1 Describe how the production, distribution, and marketing of food and fiber is part of a complex economic system	
H.12.4 Advocate a solution or combination of solutions to a problem in science or technology	B.12.1 Apply knowledge of technology to identify and solve problems D.12.3 Understand how public policy affects the food, fiber, and ornamental plant industries D.12.5 Describe how biotechnology can enhance food and fiber production D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources	
H.12.5 Investigate how current plans or proposals concerning resource management, scientific knowledge, or technological development will have an impact on the environment, ecology, and quality of life in a community or region	A.12.1 Identify how political policies and issues shape and influence food and fiber systems A.12.3 Describe how global interdependence benefits the production and distribution of food and fiber B.12.1 Apply knowledge of technology to identify and solve problems D.12.3 Understand how public policy affects the food, fiber, and ornamental plant industries D.12.6 Understand the impact emerging technologies within hydroponics, aquaculture, and biotechnology have on the food and fiber industries and natural resources E.12.2 Analyze benefits, costs, and consequences of land	

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	use E 12.4 Analyze practices used by farmers to reduce erosion and runoff to maintain soil fertility and productivity	
H.12.6 Evaluate data and sources of information when using scientific information to make decisions.	B.12.3 Use technology to acquire, organize, and communicate information by entering, modifying, retrieving, and storing data B.12.4 Access and use information for a class presentation about the impact of new technologies on the products manufactured and produced; e.g., biotechnology D.12.3 Understand how public policy affects the food, fiber, and ornamental plant industries	
H.12.7 When making decisions, construct a plan that includes the use of current scientific knowledge and scientific reasoning.	B.12.3 Use technology to acquire, organize, and communicate information by entering, modifying, retrieving, and storing data D.12.3 Understand how public policy affects the food, fiber, and ornamental plant industries	

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