

## **HAMILTON HIGH SCHOOL**

### **Course Description**

<b><u>COURSE TITLE:</u></b>	Agriculture Biology
<b><u>PREREQUISITE:</u></b>	Introduction to Agriculture and Algebra I or Consent From Instructor
<b><u>GRADE LEVEL:</u></b>	10
<b><u>LENGTH OF COURSE:</u></b>	One Year
<b><u>TEXTS:</u></b>	Modern Biology The Science of Agriculture, A Biological Approach

#### **BRIEF COURSE DESCRIPTION:**

The goal of this course is to give university bound students the opportunity to explore agriscience in an accelerated and academically challenging atmosphere. Topics to be studied include cell structure, plant science, soil science, animal and human physiology and anatomy, food science, proper laboratory procedures, and career opportunities within agriculture. In addition to the course work and assigned laboratory exercises, students will be required to complete homework and projects outside of the classroom. Furthermore, students are required to participate in at least two FFA activities per semester, which may include leadership training experiences offered by the FFA. This course satisfies the University of California laboratory science requirement for admission.

#### **GOALS AND OBJECTIVES:**

1. Students will receive basic knowledge and an appreciation for the agriculture industry, as well as advanced scientific principles common to all plants, animals and research in the field of agriculture.
2. Each student will receive the skills and training needed to complete appropriate secondary courses in science at the college preparatory or general education level.
3. Students will learn advanced record keeping skills including further and more detailed laboratory documentation using the scientific method.
4. Each student will further develop leadership skills through involvement in the FFA.
5. Students will understand the importance of agricultural biology as it impacts people and the environment and the career opportunities that grow out of this interaction.

#### **ESLR'S ADDRESSED**

##### **1.0 Content/Critical Thinker**

Students will:

- 1.1 develop mastery in individual content areas
- 1.2 use available and appropriate resources to gather and apply data and basic academic skills to solve problems
- 1.3 develop and revise plans to solve a variety of complex problems and reflectively evaluate outcomes

## 2.0 Communicator (Written and Oral)

Students will:

- 2.1 produce relevant and justifiable responses and quality work using words, number, visuals and technology
- 2.2 communicate actively, critically and reflectively

## 3.0 Citizenship/Collaboration

Students will:

- 3.1 be involved constructively in school and community in preparation for responsible citizenship
- 3.2 assume responsibility for personal wellness
- 3.3 demonstrate effective goal setting strategies to create a positive vision for their future

## 4.0 Work Ethic

Students will:

- 4.1 maintain good attendance and be prepared with instructive materials and completed assignments.

### **STANDARDS TO BE ADDRESSED:**

<b>Introduction to Agricultural Biology</b>	<b>Biology Standard</b>	<b>Ag Standard</b>
<ul style="list-style-type: none"><li>• Describe agricultural biology</li><li>• Give examples of agricultural research</li><li>• Describe the scientific method</li><li>• Practice lab skills and procedures</li></ul>		C13.1 Understand the steps of scientific method. C13.2 Analyze an animal or plant problem and devise a solution based on the scientific method. C13.3 Use the scientific method to conduct an agricultural experiment.
<b>Inorganic Foundations that Support Life</b> <i>Students will understand and describe:</i> <ul style="list-style-type: none"><li>• Soil and Water: The Chemical Foundation</li><li>• Atomic and molecular structure and chemical bonding</li><li>• Basic Soil Components</li><li>• Soil Formation Factors and Horizons</li><li>• Soil Texture and Structure</li><li>• Soil Organisms and Organic Matter</li><li>• Interrelationships of Plants and Soil</li><li>• Water Movement Properties</li><li>• Soil and Water Management</li></ul>	HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	G6.1 Understand soil types, soil texture, and structure. G6.2 Understand soil properties necessary for successful plant production. G6.4 Understand how soil biology affects the environment and natural resources. C10.1 Recognize the major soil components and types.
<b>Cell Biology</b> <i>Students will understand and describe:</i> <ul style="list-style-type: none"><li>• Plant and Animal Cell Identification and Functions</li><li>• Plant and Animal Cell Structure and Functions</li><li>• Cellular Respiration</li><li>• Cellular Transport</li></ul>	HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. HS-LS1-4. Use a model to	G2.1 Understand the differences between prokaryotic cells and plant and animal eukaryotic cells. G2.2 Understand plant cellular function reactions when plants are grown under different condition.

<ul style="list-style-type: none"> <li>• Cell Differentiation</li> <li>• Chemiosmotic Gradients and ATP Production</li> <li>• Macromolecules in Cells</li> </ul>	<p>illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.</p> <p>HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.</p> <p>HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.</p>	<p>G2.3 Understand what functions organelles play in the health of the cell.</p> <p>G2.6 Understand which organelles in plant cells carry out photosynthesis.</p> <p>C5.2 Know how cell parts function.</p> <p>C5.3 Understand various cell actions, such as osmosis and cell division.</p>
<b>Plant &amp; Animal Genetics</b>		
<p><i>Students will understand and describe:</i></p> <ul style="list-style-type: none"> <li>• Heritability and Genetic Traits</li> <li>• Dominant and Recessive Genes</li> <li>• Genotype and Phenotype</li> <li>• Cellular Reproduction: Mitosis and Meiosis</li> <li>• Physical and Chemical Structures Involved in Genetics</li> <li>• DNA and Types of DNA</li> <li>• DNA Replication</li> <li>• Mendel – Independent Assortment and Segregation</li> <li>• Biotechnology and Cloning</li> <li>• Proteins and RNA</li> <li>• Role and Function of Amino Acids in Genetics</li> <li>• Mutation and Sexual Reproduction</li> </ul>	<p>HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.</p> <p>HS-LS3-1. Clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.</p> <p>HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.</p> <p>HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.</p>	<p>G2.4 Understand the part of the cell that is responsible for the genetic information that controls plant growth and development.</p> <p>G2.5 Understand plant inheritance principles, including the structure and role of DNA.</p> <p>D5.1 Evaluate a group of animals for desired qualities and discern among them for breeding selection.</p> <p>D5.2 Understand how to use animal performance data in the selection and management of production animals.</p> <p>D5.3 Research and discuss current technology used to measure desirable traits.</p> <p>D5.4 Understand how to predict phenotypic and genotypic results of a dominant and recessive gene pair.</p> <p>D5.5 Understand the role of mutations and hybrids in animal genetics.</p> <p>G11.5 Understand the effects of agricultural biotechnology, including genetically modified organisms, on the agriculture industry and the larger society and the pros and cons of such use.</p> <p>C7.5 Understand the purpose and process of mitosis and meiosis.</p>
<b>Plant Physiology, Reproduction, Photosynthesis and Growth</b>		
<p><i>Students will understand and describe:</i></p>	<p>HS-LS1-5. Use a model to</p>	<p>G2.6 Understand which</p>

<ul style="list-style-type: none"> <li>Plant Structures &amp; the Process of Photosynthesis</li> <li>Plant Growth Requirements</li> <li>Monocotyledons and Dicotyledons</li> <li>Sexual and Asexual Reproduction</li> <li>Research Applications to Plant Biotechnology</li> <li>Chemical and Environmental Factors Affecting Plant Growth</li> </ul>	<p>illustrate how photosynthesis transforms light energy into stored chemical energy.  HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.</p>	<p>organelles in plant cells carry out photosynthesis.  G3.1 Understand plant systems, nutrient transportation, structure, and energy storage.  G3.2 Understand the seed’s essential parts and functions.  G3.3 Understand how primary, secondary, and trace elements are used in plant growth.  G3.4 Understand the factors that influence plant growth, including water, nutrients, light, soil, air, and climate.  G1.5 Understand the differences between monocots and dicots.  G4.1 Understand the different forms of sexual and asexual plant reproduction.</p>
<b>Animal Physiology and Reproduction</b>		
<p><i>Students will understand and describe:</i></p> <ul style="list-style-type: none"> <li>Internal Systems of Animals</li> <li>The Digestive Process</li> <li>The Respiratory System</li> <li>The Reproductive System</li> <li>The Circulatory System</li> <li>The Endocrine System</li> <li>The Nervous System</li> <li>The Immune System</li> </ul>	<p>HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.</p>	<p>D3.1 Understand the major physiological systems and the function of the organs within each system.  D3.2 Understand the animal management practices that are likely to improve the functioning of the various physiological systems.  D4.0 Students understand animal reproduction, including the function of reproductive organs.</p>
<b>Animal Nutrition</b>		
<p><i>Students will understand and describe:</i></p> <ul style="list-style-type: none"> <li>Feed Identification and Nutrient Evaluation</li> <li>Feed Additives</li> <li>Ration Formulation</li> <li>Animal Nutrient Requirements</li> <li>Vitamin and Amino Acid Requirements</li> <li>Nutritional Diseases</li> </ul>		<p>D2.1 Understand the flow of nutrients from the soil, through the animal, and back to the soil.  D2.2 Understand the principles for providing proper balanced rations for a variety of production stages in ruminants and monogastrics.  D2.3 Understand the digestive process of the ruminant, monogastric, avian, and equine digestive systems.  D2.4 Understand how animal nutrition is affected by the digestive, endocrine, and circulatory systems.</p>
<b>Animal Health &amp; Diseases</b>		
<p><i>Students will understand and describe:</i></p> <ul style="list-style-type: none"> <li>Disease Agents</li> <li>Causes of Disease</li> <li>Infectious and Noninfectious Diseases</li> <li>Animal Health Practices</li> </ul>	<p>HS-LS2-8. Evaluate the evidence for the role of group behavior on individual and species’ chances to survive and reproduce.  HS-LS4-2. Construct an explanation based on evidence</p>	<p>D6.1 Understand the signs of normal health in contrast to illness and disease.  D6.2 Understand the importance of animal behavior in diagnosing animal sickness and disease.  D6.3 Understand the common</p>

<ul style="list-style-type: none"> <li>Common Internal &amp; External Parasites Lifecycles</li> </ul>	<p>that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.</p>	<p>pathogens, vectors, and hosts that cause disease in animals.  D6.4 Understand prevention, control, and treatment practices related to pests and parasites.  D6.5 Apply quality assurance practices to the proper administration of medicines and animal handling.  D6.6 Understand how diseases are passed among animal species and from animals to humans and how that relationship affects health and food safety.</p>
<p><b>Taxonomy Of Modern Agricultural Plants and Animals</b></p>		
<p><i>Students will understand and describe:</i></p> <ul style="list-style-type: none"> <li>Development of the Binomial System of Nomenclature</li> <li>Classifications of Major Groups of Plants and Animals</li> <li>Evolutionary Relationships</li> <li>Development of the Kingdom Concept</li> <li>Comparisons of Modern Agricultural Plants and Animals</li> </ul>	<p>HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.  HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.  HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.  HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.</p>	<p>F1.1 Understand how to classify plants by order, family, genus, and species.E8.1 Understand the scientific method of animal classification, including order, family, genus, and species.</p>
<p><b>Ecology—Plants &amp; Animals</b></p>		
<p><i>Students will understand and describe:</i></p> <ul style="list-style-type: none"> <li>Biodiversity</li> <li>Conserving Natural Resources</li> <li>Agricultural Practices Beneficial and Harmful to the Environment</li> <li>The Ecosystem and Population Fluctuations</li> <li>The Nitrogen Cycle</li> <li>The Oxygen Cycle</li> <li>The Food Web</li> </ul>	<p>HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those</p>	<p>D7.2 Know how rangeland management practices affect pasture production, erosion control, and the general balance of the ecosystem.  D7.3 Understand how to manage rangelands for a variety of animal species and locations. Know how to calculate carrying capacity.  D7.4 Understand how to balance</p>

	<p>organisms that are better able to survive and reproduce in the environment.</p> <p>LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.</p> <p>HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.</p> <p>HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.</p>	<p>rangeland use for animal grazing and for wildlife habitat.</p> <p>G9.1 Understand how to identify and classify the plants and animals in an agricultural system (as producers, consumers, or decomposers).</p> <p>G9.2 Understand the elements of conventional, sustainable, and organic production systems.</p> <p>G9.3 Understand the components of “whole-system management.”</p>
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**TESTS, QUIZZES, AND PROJECTS:**

- Advance notice will be given for all tests.
- Advance notice for quizzes may or may not be given.
- Projects will be discussed in class and every project will have specific instructions. Expect one large project per semester.

**CLASSWORK, HOMEWORK, NOTEBOOKS, AND FFA ACTIVITIES:**

- Homework helps reinforce ideas taught in the classroom and will be given throughout the year.
- Every student will have a 3 ring binder. This notebook will hold all notes, handouts, daily starters, homework, projects, and laboratory research.
- Notebooks will need to be in class everyday and will be graded on completeness without prior notice throughout the year. Please keep them up to date and accurate.
- Attendance is important, as the activities involving discussion and classroom participation are valuable and notes cannot substitute what took place in the classroom. It is the responsibility of the students to make up any missed notes or assignments within **2 days** of an excused absence. This can best be done before school, not during class instructional time. **LATE ASSIGNMENTS WILL NOT BE ACCEPTED!** More than 5 absences may result in a loss of credits.
- Every student will be expected to participate in **2 FFA activities per semester**. FFA activities will be announced, posted in class, and sent out in the FFA newsletter.
- Every student will keep a web based FFA record book that corresponds to his or her activities and projects. The project must relate to agriculture where students can document money spent/earned, or hours worked.

**PARTICIPATION, COOPERATION, AND ATTITUDE:**

- Every student will be expected to arrive for class prepared with their notebook, text book, paper, and a pen or pencil by the time the tardy bell rings.
- Participation, cooperation and a positive attitude are encouraged from every student.
- While participating in agriculture classes, school farm activities, and FFA I understand my picture may be taken and used in media promoting FFA and Hamilton High School.

**EVALUATION:**

Grades will be determined as follows:

Tests, Quizzes, and Projects	40%
Classwork, Homework, and Notebook	40%
FFA	10%
Class Participation	10%

After total points have been determined, your letter grade will be calculated on the following percentages:

A= 90-100%	D= 60-69%
B= 80-89%	F= 59% and below
C= 70-79%	

I \_\_\_\_\_ (print student name) understand what is expected of me and will do my best to complete all class requirements.

Student Signature \_\_\_\_\_

I, the parent/guardian have read and understand what is expected of the student to complete the class requirements.

Parent/Guardian Signature \_\_\_\_\_