

NAPA COUNTY OFFICE OF EDUCATION – CAREER TECHNICAL EDUCATION  
Standardized Course Outline Format

COURSE TITLE

P CTE Agricultural Biology

DATE

Feb. 2013

INDUSTRY SECTOR/PATHWAY

Agriculture and Natural Resources / Animal Science

UC A-G APPROVED

Approved for UC “d” science

GRADE LEVELS

9, 10, 11, 12

OCCUPATIONS FOR IDENTIFIED PATHWAY

Veterinarian Technician

Animal Caretaker/Kennel Operator

Animal Breeder

Ranch Manager

Feed Nutritionist

Research Assistant/Associate

Water Quality Specialist

Plant Scientist

Agriscience Teacher

Entomologist

COURSE OVERVIEW

This course provides entry-level training in Agricultural-related occupations. Employment possibilities include entry level positions at state parks, landscaping, farm and ranches, and animal care. The Agricultural Biology coursework includes students studying plants and animals, and their interaction with their environment. Students will be taught an introduction to agriculture research and environmental science. This course is designed to teach students the importance of agriculture biology, chemistry, physics and birth systems as it impacts people and the environment as well as related career opportunities. Thies course introduces students to leadership opportunities through FFA.

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**CAREER PREPARATION STANDARDS**

Understand how personal skill development—including positive attitude, honesty, self-confidence, time management, and other positive traits—affect employability.

1. Demonstrate an understanding of the classroom and policies and procedures.
2. Understand the importance of ethical standards and social responsibilities associated with the Animal Science Pathway.
3. Discuss and define personal hygiene and acceptable business attire and grooming.
4. Learn methods for prioritizing tasks and meeting deadlines.
5. Discuss importance of lifelong learning.
6. Discuss the importance of the following personal skills in the Animal Science Pathway:
  - positive attitude
  - self-confidence
  - ethics
  - integrity
  - honesty
  - perseverance
  - self-discipline

Understand principles of effective interpersonal skills, including:

Group dynamics, conflict resolution and negotiation and their importance within the Animal Science Pathway.

1. Identify and discuss the key concepts of group dynamics.
2. Discuss and demonstrate the dynamics of conflict resolution and negotiation and their importance within the law enforcement forensics environment.
3. Work cooperatively, share responsibilities, accept supervision, and assume leadership roles.
4. Demonstrate cooperative working relationships and proper etiquette across gender and cultural groups.
5. Discuss laws which apply to sexual harassment and discuss tactics for handling harassment situations.

Understand the importance of good academic skills, critical thinking and problem-solving skills in the workplace.

1. Recognize the importance of good reading, writing, and math skills and implement a plan for self-improvement as needed.
2. Read, write, and give directions.
3. Exhibit critical and creative thinking skills and logical reasoning skills.
4. Recognize problem situations; identify, locate, and organize needed information or data; and propose, evaluate, and select from alternative solutions.

Understand principles of effective communication.

1. Read and implement written instructions, when required.

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2. Present a positive image through verbal and non-verbal communication.
3. Demonstrate active listening through oral and written feedback.
4. Communicate effectively orally and in writing.
5. Use effective telephone skills.
6. Respond to written orders when required.
7. Identify, follow, and enforce rules and regulations.

Understand occupational safety issues, including avoidance of physical hazards.

1. Discuss and implement good safety practices, including the following:
2. Avoidance and reporting of physical hazards in the work environment.
3. Safe operation of equipment
4. Proper handling of hazardous materials
5. Bloodborne pathogens
6. Demonstrate and apply universal precautions.
7. Explain and follow all safety procedures.

Understand career paths and strategies for obtaining employment.

1. Explore career opportunities and projected trends, investigate required education, training, and experience.
2. Identify steps for setting goals and writing personal goals and objectives.
3. Examine aptitudes related to career options; relate personal characteristics and interest to educational and occupational opportunities
4. Identify and demonstrate effective interviewing techniques.
5. Make realistic occupational choices
6. Develop job acquisition documents, including the following:
  - a. job application
  - b. resume
  - c. appropriate cover and follow-up correspondence
  - d. portfolio

Understand and adapt to changing technology.

1. Identify and explain the importance of the current available computer diagramming software used today in the forensic field.
2. Understand the importance of lifelong learning in adapting to changing technology.
3. Understand the importance of cell phones, pagers, fax machines, and other communication technology.
4. Correctly use and care for all supplies and equipment.

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**Instructional Methods and/or Strategies**

Students will be engaged in a variety of activities that balance direct instruction with project work. Students will be expected to apply the academic and applied concepts and processes learned during direct instruction to their projects. Students will attend lectures, complete labs, complete real world projects, and make presentations that demonstrate understanding of physical concepts and the application process. Methods of instruction will include:

- Direct Instruction (lectures, discussions, reading and lab activities specific for mastery of content)
- Use of community based research projects and with professional mentors, development of language arts skills while student complete reports, journals, analyses, and essays
- Use of a variety of instructional materials and resources including electronic media, handbooks, professional journals, reference materials, and textbooks
- Self-directed, cooperative, and collaborative learning opportunities to increase responsibility of student for their own learning
- Use of student presentations, exhibits, and competitions

**Assessment Including Methods and/or Tools**

- Traditional Summative Assessments (Tests and Quizzes including Midterms and a Final Exam)
- Laboratory Reports and Activities
- Individual and Group Research Projects and Presentations
- Non-Lab Class Assignments
- Homework
- Formative Assessment (Class Activities, Debates, Discussion)

**COURSE CONTENT**

**Unit 1: Leadership & Team Building Development**

Learning Objectives:

- a. Oral and Speaking Presentations
- b. Critical Thinking Exercises
- c. Problem Solving Exercises

**Sample Assignments**

Embedded Throughout Course

Why FFA? And MyPLAN: Students identify the opportunities that the FFA gives them at the local, state and national level. They then create a four year plan for the leadership activities that they would like to be involved in.

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FFA Emblem Collage: Students create a collage that illustrates their interests and aspirations. On the opposite side students create an illustration of the FFA Emblem that is accurate to the emblem components and the official FFA colors. Students will present their collages to the class upon completion.

Anchor Standards

3.6, 9.1, 9.2, 9.3, 9.4, 9.7, 9.8, 9.9, 9.12, 9.13, 10.2, 10.4, 10.5, 10.6, 10.7, 10.8, 11.1, 11.2, 11.3, 11.4

Pathway Standards

C1.1, C1.2, C1.3

**Unit 2: Introduction to Agricultural Biology**

Learning Objectives:

- a. What is Agricultural Biology and its Importance
- b. Research Uses of Agricultural Biology
- c. The Scientific Method
- d. The Metric System
- e. Safety in the Lab and on the Farm

Sample Assignments or Projects

Identifying Controls and Variables Lab: Students conduct a virtual lab that asks them to manipulate variables to gauge the change in scientific results.

Animal Rights vs Animal Welfare Socratic Seminar: Students research how animals are used in scientific research and form an opinion on the necessity of their use in research. They define the difference between animal rights and animal welfare. Students participate in a class discussion and form a compromised conclusion.

Anchor Standards 2.1, 2.2, 2.3, 4.3, 4.4, 5.1, 6.1, 6.2, 6.3, 6.4, 8.1, 8.2, 8.3

Pathway Standards C4.4, C4.5, C13.1, C13.2, D9.2, D9.3, D12.1

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**Unit 3: Organisms and Their Ecological Environment**

Learning Objectives:

- a. Biodiversity
- b. Conserving Natural Resources
- c. Agricultural Practices Beneficial and Harmful to the Environment
- d. The Ecosystem and Population Fluctuations
- e. The Nitrogen Cycle
- f. The Oxygen Cycle
- g. The Food Web

Sample Assignments

Food Chains and Food Web Poster: Students work with a partner to create a cohesive food web that illustrates the energy relationships within an ecosystem.

Immigration vs Emigration: Students use critical thinking and basic math functions to determine the difference between immigration and emigration and show the fluctuation between two populations of organisms.

Anchor Standards 5.1, 5.2, 10.1, 10.4

Pathway Standards C2.1, C2.2, C2.3, C2.4, D2.1, D7.2, D7.4,

**Unit 4: Cell Biology**

Learning Objectives:

- a. Plant and Animal Cell Identification and Functions
- b. Plant and Animal Cell Structure and Functions
- c. Cellular Respiration
- d. Cellular Transplant
- e. Cell Differentiation
- f. Chemiosmotic Gradients and ATP Production
- g. Macromolecules in Cells

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Sample Assignments

“A cell as a...” Analogy Poster: Students work together in groups to create a poster illustrating an analogy for a cell.

Cell Dairy Farm: Students research the different parts of a dairy farm and compare the daily operations, tasks and equipment on the farm to the different working parts of a cell.

3D Cell Model: Students choose between a plant or animal cell and create a 3D model.

Anchor Standards 5.1, 9.7, 10.1, 10.3

Pathway Standards C5.1, C5.2, C5.3, C5.4, D3.1, D8.2, D12.3, G2.1, G2.3, G2.4, G2.6

**Unit 5: Plant Physiology, Reproduction, Photosynthesis and Growth**

Learning Objectives:

- a. Plant Structures & the Process of Photosynthesis
- b. Plant growth Requirements
- c. Monocotyledons and Dicotyledons
- d. Sexual and Asexual Reproduction
- e. Research Applications to Plant Biotechnology
- f. Chemical and Environmental Factors Affecting Plant Growth

Sample Assignments

Seed Germination Lab/Garden Box Responsibility: Students study the different factors that could affect seed germination, observe and log the changes in seed germination stages then conduct research to determine the best fruits and vegetables to plant for the spring season. Students are responsible for sowing seeds, transplanting and maintaining garden beds through the duration of the spring semester.

Anchor Standards 3.7, 3.8, 4.3, 5.3, 6.3, 6.4, 6.5, 6.6, 7.2, 7.3, 7.4, 7.5, 8.1, 8.3, 8.5, 9.3, 9.6, 9.7, 9.8, 9.10, 9.12, 9.13, 10.3, 10.6, 10.7, 10.8, 11.1, 11.3, 11.4,

Pathway Standards C3.2, C5.3, C10.1, C10.2, C10.3, C10.4, C11.1, C11.2, C11.3, C11.4, C11.5, C11.6, G1.5, G3.4, G3.6, G4.1, G4.2, G5.5

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**Unit 6: Plant and Animal Genetics**

Learning Objectives:

- a. Heritability and Genetic Traits
- b. Dominant and Recessive Genes
- c. Genotype and Phenotype
- d. Cellular Reproduction: Mitosis and Meiosis
- e. Physical and Chemical Structures Involved in Genetics
- f. DNA and Types of DNA
- g. DNA Replication
- h. Mendel – Independent Assortment and Segregation
- i. Biotechnology and Cloning
- j. Proteins and RNA
- k. Role and function of Amino Acids in Genetics
- l. Mutation and Sexual Reproduction

Sample Assignments

Phases of Mitosis and Meiosis Cookie Lab: Students create the stages of mitosis and meiosis using oreo cookies and different colored sprinkles to illustrate the steps of both.

Candy DNA Lab: Students create an edible model of DNA using licorice, gummy bears and, tooth picks and pipe cleaners to demonstrate the pairing of the different amino acids.

Create-A-Cow: Students practice mono and dihybrid crosses and punnett squares and explore how genetics can be compared to rolling a dice.

Anchor Standards 5.1, 5.2, 10.1, 10.3, 11.1

Pathway Standards C3.3, C3.4, C7.1, C7.3, C7.5, D4.5, D5.1, D5.3, D5.4, D5.5

**Unit 7: Evolution**

Learning Objectives:

- a. Understand the concepts of natural selection

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- b. Identify the evidence of evolution
- c. Determine the difference between theory and accepted scientific fact
- d. Understand the mechanisms of evolution

Sample Assignments

Bird Beak Lab: Students explore the necessity of different evolutionary mechanisms in animals by participating in an activity that requires them to use different “tools” for consuming “food”.

Evolutionary Limbo: students participate in a game of limbo to form a connection in the build of their own bodies and the ability to succeed or fail in a physical game. They are able to understand how some physical characteristics enable certain organisms to survive in an environment while others struggle.

Anchor Standards 5.1, 5.3, 10.1

Pathway Standards C4.1, C4.2, D5.1, D5.5

**Unit 8: Animal Physiology and Reproduction**

Learning Objectives:

- a. Internal Systems of Animals
- b. The Digestive Process
- c. The Respiratory System
- d. The Reproductive System
- e. The Circulatory System
- f. The Endocrine System
- g. The Nervous System
- h. The Immune System

Sample Assignments

Physiology Picture Book: Students work together in a group to create a comprehensive picture book of the different physiological body systems of a chosen livestock animal. Each body system must be illustrated and vital parts of each system must be described.

Anchor Standards 2.1, 2.2, 4.1, 7.2, 7.3, 7.4, 9.6, 9.10, 10.3

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Pathway Standards C6.1, C6.2, D3.3,

**Unit 9: Career Opportunities Associated With Agricultural Biology**

Learning Objectives:

- a. Identify and research a career within the agriculture sector.
- b. Create a presentation that allows you to discover the importance of agriculture careers and communicate with an expert in the agriculture and natural resources sector.

Sample Assignments

Ag Career Research Project: Students select a career that falls within the agriculture and natural resources sector. They create a poster that displays all the requirements to obtain the position, salary, day to day duties, trends, outlook, ethics, perks and downfalls, and conduct an interview with an adult that is employed in that position.

Career Aptitude Test: Participate in an aptitude test that directly identifies an agriculture career that would best suit the character traits of the student.

Anchor Standards 2.4, 2.5, 2.6, 3.1, 3.2, 3.3, 3.4, 3.5, 3.9, 4.2, 4.3, 4.5, 8.4, 9.4, 9.5, 10.4

Pathway Standards C1.1, C1.2, C1.3, C3.1

**PREREQUISITES**

None

**ACADEMIC CREDIT**

1 year/10 credits

**CERTIFICATION**

**ARTICULATION**

Look at SRJC or Modesto JC

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## INSTRUCTIONAL STRATEGIES

Lecture and Demonstrations  
Multimedia Sources  
Project-Based Learning  
Work-Based Learning

## INSTRUCTIONAL MATERIALS / TEXTBOOKS

§ *Modern Biology* (Holt, Rinehart & Winston)  
§ *Laboratory Investigations in Biology* (Pearson)  
§ *Biological Science Applications in Agriculture* (Osborne)  
§ *Agriculture Biology Lab Manual Revised* (Fullerton)

## STANDARDS SUMMARY

### Agriculture and Natural Resources Knowledge and Performance Anchor Standards

2.1 - 2.6, 3.1 - 3.9, 4.1 - 4.5, 5.1 - 5.3, 6.1 - 6.6, 7.2 - 7.5, 8.1 - 8.5, 9.1 - 9.10, 9.12 - 9.14, 10.1- 10.8, 11.1 - 11.4

### Animal Science Pathway Standards

D2.1, D3.1, D3.3, D4.5, D5.1, D5.3 - D5.5, D7.2, D7.4, D8.2, D9.2, D9.3, D12.1, D12.3

### Agriscience Pathway Standards

C1.1 - C1.4, C2.1 - C2.4, C3.1 - C3.4, C4.1, C4.2, C4.4, C4.5, C5.1 - C5.4, C6.1, C6.2, C7.1, C7.3 -C7.5, C10.1 - C10.4, C11.1 - C11.6, C13.1, C13.2

### Plant and Soil Science Pathway Standards

G1.5, G2.1, G2.3, G2.4, G2.6, G3.4, G3.6, G4.1, G4.2, G5.5

### Common Core and Academic Standards

#### **English Language Arts**

LS 9-10, 11-12.6, SLS 9-10, 11-12.1, 11-12.2, RSTS 9-10, 11-12.4,  
RLST 9-10.3, 9-10.4, 9-10.5, 9-10.7, 11-12.3, 11-12.4  
WS 9-10.4, 9-10.7, 9-10.8, 9-10.9, 11-12.4, 11-12.6, 11-12.7, 11-12.9, 11-12.10

#### **Math**

A-CED 1.1, A-APR 1, A-REI 3.1, F-IF 4, G-CO 12, G-MD 3, G-MG 2, G-SRT 8.1, S-IC 1, 3, 5, S-ID 1, 2, 7

#### **Science**

SEP 1, 2, 3, 4, 5, 6, 7, 8, CC 1, 2, 3, 4, 5, 6, 7 PS1, PS3.D, LS 1-4, ESS 2A, 2.C, 2.E, ESS 3.A, B, C, ETS2

#### **History/Social Science** US 11.6.3