**Animal and Plant Physiology**

DPC# 0010

**Course Information**

Grade Level: 9 - 12

Length of course: Two Semesters

Type of Elective.

Recommendation for Enrollment: None

**Brief Description of the Course:**

This course is designed to provide a foundation in Biology in addition to addressing Chemistry and Physics through real world experiences in agriculture for students in grades 9 - 12.

**Board-adopted Textbook/Curriculum:**

Cooper, Elmer L. Agriscience: Fundamentals and Applications Third Edition (2002). Albany, New York: Delmar Publishers.

Cooper, Elmer L. Agriscience: Fundamentals and Applications Laboratory Manual (1990). Albany, New York: Delmar Publishers.

**Supplementary Instructional Materials**

Items listed below are commonly used as supplementary materials and are coordinated with the adopted course objectives:

Physical Science Applications in Agriculture. By Buriak, Phillip and Osborne, Edward W., The Interstate Publishers, Inc. 1996. ISBN 8134-3013-5.

Biological Science Applications in Agriculture. By Buriak, Phillip and Osborne, Edward W., The Interstate Publishers, Inc. 1994. ISBN 8134-2759-9.

California Supervised Agricultural Experience Record Book

FFA Student Handbook

Model Agriculture Core Curriculum

Handouts

Videos

 DVD's

 Internet

**Brief outline of Course Content:**

Meeting Human Needs in a Changing World

Food sources

Human needs

Agricultural industry

Quality of life

Renewable natural resources

Using Science and Technology

The meaning of agri-science and technology

Relation of agriculture to science

1. Physical Sciences

2. Biological Sciences

3. Social Science

Methods of agri-scientist thinking

1. Scientific method

2. Practical use

New areas of agri-science

1. Biotechnology

2. Genetic engineering

3. Remote sensing

4. Laser technology

5. Computer applications

Issues associated with agri-science and technology

Using the Earth's Resources

Environmental and natural resources

Renewable resources

1. Water cycle

2. Forests

3. Air

Non-renewable Resources

Environmental Pollution

Agricultural pollution prevention

Using the Science of Computation

Measurement systems

Agri-science measurements

Problem solving in measurements

Determining the bases of Life

Life processes

Structural basis

1. Cell structure

2. Heredity and genetics

Mitosis and Meiosis

Classifying and Naming Living Things

A Scientific classification system

Classification kingdoms

Cultural Practices Laboratory work

Applying principles of plant Science

Classification and Life cycles

Vegetative plant parts

1. Leaves

2. Stems

3. Roots

4. Flowers

5. Seeds

Helpful tropisms

Reproducing Plants

Propagation

1. Sexual

2. Flowers

a. Pollination

b. Fertilization

c. Germination

1. Asexual

a. Methods of vegetative reproduction

Understanding Plant Processes

Photosynthesis

Respiration

Transporation

Plant nutrients

1. Essential elements

2. Other essential elements

Using fertilizer

1. Soil testing

2. Tissue analysis

3. Laboratory work

Keeping Plants Healthy

Preventing pest problems

Integrated pest management

Safety practices

Applying Principles of Animal Science - Anatomy and Physiology

Feeding Animals

Feeding needs

Livestock nutritional needs

Nutrient sources

Feed additives and implants

Feed manufacturing

Feed labeling

Breeding Animals

Breeds and bloodlines

Breeding systems

Production systems

Livestock insemination methods

Breeding herd management

Keeping Animals Healthy

Good health signs

Environmental influences

Good health maintenance

Diseases - specific kinds

Using Biotechnology for Improving Life

Biotechnology

Biotechnology areas

Molecular biotechnology: genetic importance

Growth processes

Genetic engineering

Applying Principles of Earth Science in Agriculture

The earth's resources

Earth's changes

Atmospheric importance

Climate succession

Applying Principles of Soil Science

Soil classification

Soil make-up

Physical structure

Chemical nature

Biological nature

Soil formation

Soil profile

Water formations

Applying Principles of Chemistry

Matter: states and properties

b. Periodic table of elements

Chemical bonds

Chemical reactions

Solutions and suspensions

Agri-science applications

Acids, bases, and salts

Applying Principles of Physics

Physical reactions

Physic areas

Work and power

Machines and machinery

Thermal energy

Internal combustion engines and fuels

Electrical energy

Compression power

Marketing Technology in Agri-science

Agricultural marketing technology

Technological methods

Marketing functions

Processing Technology in Agri-science

Human needs

Food

Fiber

Wood

Preservation methods

Safety and regulations

Introduction to FFA and Leadership Activities

History and organization structure

Individual opportunities

Chapter structure and operation

Leadership development activities

1. Career development events (judging contests, individual and

 team)

2. Committee organization

3. Officer Responsibilities

Parliamentary procedure and proper use

Career identification and selection

Agriculture Careers

Agriculture in the work place

Present status of agriculture as a career choice

Future outlook for agriculture career

Educational requirements

1. Technical careers

2. Colleges and universities

Basic employment requirements

Basic attitudes and personal skills

Resume' construction

Applications

Interviewing skills

Computer Applications

Hardware and software

Word processing

Spreadsheets including computerized record keeping systems

**Assessment Procedures:**

The following is a list of techniques that may be used in assessing student progress of pre/post diagnostic assessment:

1. Tests and Quizzes

2. Research Documents

**Plant & Animal Physiology**

**Clovis East HS**

**Meets the UC “g” Admission Requirement**

**Approved 2003**

**I. COURSE INFORMATION:**

A. Course Title: Plant & Animal Physiology

 B. Grade Level: 11-12 Grades

 C. Length of Course: 1 year

 D. Prerequisites: Algebra I & Agricultural Biology

**II. MAJOR GOAL AND STUDENT OUTCOMES:**

A. The application of advanced scientific technology and knowledge is increasing at a rate second only to the need for well-trained and educated individuals in all areas of agriculture sciences. This course is intended to successfully prepare those students who plan on majoring in agricultural sciences or related fields of agricultural endeavor.

 B. Specific course goals include:

1. Use scientific methods applied to plant and animal anatomy and physiology.

2. Show familiarity with the major physiological systems of the plant and animal physiology.

3. Show familiarity with the anatomical animal tissues/organs/systems.

4. To learn the nature of scientific inquiry and incorporate the use of the scientific method in laboratory investigations and agriculture.

5. To identify the basic processes of cellular and organism growth and reproduction.

6. To recognize the diversity of life and the interrelationships among all organisms.

7. To understand the role of genetics in organism variation and adaptation.

8. Relate the study of animal structure‑form in relation to veterinary arts.

9. To acquire agricultural and biological vocabulary, and the reading, writing, and critical thinking skills pertaining to the science.

**III. COURSE OBJECTIVES:**

A. The course objectives are as follows:

1. To develop an appreciation of agricultural sciences.

2. To incorporate scientific methods and biological principles with modern agricultural practices.

3. To create an awareness of the importance of biological and agricultural sciences.

4. To prepare students for college level entry in the various disciplines of agriculture science.

**IV. COURSE OUTLINE:**

A. Unit I: Agricultural Effect on Environmental Ecology

1. Categories and sources of pollution

2. Conserving natural resources

3. Agricultural practices beneficial/harmful to the environment

Alternatives

B. Unit II: Animal Diseases & Health

1. Diseases and parasites

2. Predisposing conditions

3. Biologic preparations, antibiotics, drugs and other medications

4. Health & sanitation requirements and procedures

C. Unit III: Anatomy and Physiology of Animals

1. Body Systems

2. Physiological function of hormones

3. Process of Digestion

4. Functions of reproductive tracts

D. Unit IV: Animal Breeding and Genetics

1. Cell theory of inheritance

2. Heritability percentages of traits

3. Mitosis and meiosis applied to animal growth

4. Artificial Insemination

5. Embryo transplants

E. Unit V: Animal Nutrition and Feeds

1. Classes of nutrients and additives

2. Animal nutrient requirements

3. Health problems related to nutrition

4. Balancing rations and feed practices

F. Unit VI: Plant Physiology and Growth

1. Structure and development of plants

2. Plant growth requirements

3. Environmental factors on growth and physiology

4. Optimum conditions and prescribed practices

G. Unit VII: Plant Pathology and Entomology

1. Common diseases and etiology

2. Effects on development and growth

3. Methods of control

4. Orders of insects

5. Insect structure and development

H. Unit VIII: Soils

1. Components, functions, economic uses, and relationship to the earth

2. Geologic cycle

3. Chemical and physical weathering

4. Soil formation

5. Local conditions and factors

I. Unit IX: Plant Nutrients and Fertilizers

1. Primary, secondary and micronutrients

2. Pure form vs. commercial form nutrients

3. Organic, inorganic and natural organic fertilizers

4. Function of nutrients in plant growth

5. PH requirements and effect on plant life

6. Nitrogen fixation and absorption

J. Unit X: Pest Management

1. Invertebrates, vertebrates, and weed pests

2. Cultural, chemical and biological controls

3. Introduction of integrated pest management

4. Organo-phosphates and chlorinated hydrocarbons and their effect on body systems

5. Environmental considerations

K. Unit XI: Wildlife & Animal Management

1. History and principles

2. Habitat destruction

3. Economic feasibility and current trends

4. New scientific principles

L. Unit XII: Agriculture Research Project

1. Development of viable agriculture project by student

2. Statistical management of project by student

3. Instructional coordination of project by instructor

4. Analysis of project results by student & instructor

M. Unit XIII: Leadership Development

1. Students will be required to participate in Leadership Development activities which will include: speaking contests, team building activities, critical thinking activities and community service.

N. Unit VIX: Professional Opportunities in Plant & Animal Science

1. Plant & animal research fields

Other related plant & animal science fields

Colleges & universities with plant & animal majors

**V. TEXTS & SUPPLEMENTAL INSTRUCTIONAL MATERIALS:**

Modern Biology (2002). Holt, Rinehart & Winston Publishers

Biological Science Applications in Agriculture (1997). Prentice-Hall-Interstate, Lebannon, Indiana

**VI. KEY ASSIGNMENTS:**

A. Weekly academic textbook assignments

Weekly laboratory activities & report

Plant & Animal Physiology Term Paper

Supervised Agricultural Experience Project & Date Collection

Student Seminar Presentation related to Plant & Animal Physiology Topic

Portfolio of Laboratory Exercises

Leadership Development Activities

**VII. INSTRUCTIONAL METHODS:**

A. 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, become involved with professional mentors, complete real world projects, and make presentations that demonstrate understanding of physical concepts and the application process.

B. Methods of instruction will include, but is not limited to:

1. Direct instruction (lectures, discussions, readings, and lab activities specific for mastery of content).

2. Use of community-based research projects and with professional mentors, development of language arts skills while students complete reports, journals, analyses, and essays.

3. Use of a variety of instructional materials and resources including electronic media, handbooks, professional journals, reference materials, and textbooks.

4. Self-directed, cooperative, and collaborative learning opportunities to increase responsibility of students for their own learning.

5. Use of student presentations, exhibits, and competitions, and

SDAIE (Specially Designed Academic Instruction in English).

**VIII. ASSESSMENT METHODS:**

A. Assessment opportunities that allow continuous evaluation of students' progress should be embedded throughout the course and should be a learning experience. All students will be expected to achieve a high understanding of all topics; often demonstration of knowledge will occur in a public forum. The following strategies, which include both formal and informal assessment techniques, may include, but are not limited to:

1. Performance-based assessments such as demonstrations, discussions, simulations, and projects

2. Presentations, (both team and individual) written assignments, (both team and individual),

3. On-going and cumulative portfolio of investigative accomplishments.

4. Written tests with a variety of short answer and essay questions.

5. Written assignments, (such as justifications, investigations, and research, evaluative, or technical), and individual and group assessments including the assessment working relationships.

B. Grading will be based on the following assessment areas:

1. Tests & Quizzes 40%

2. Laboratory Investigation 20%

3. Portfolio & Writing Assignments 20%

4. Leadership & Critical Thinking Activities 10%

5. Research report and oral presentation 10%

**IX. LABORATORY ACTIVITIES:**

 A. The Scientific Method

 B. Analyzing Ecosystems

 C. Checking water for Coliform Bacteria

 D. Genotypic and phenotypic ratios

 E. Cell identification

 F. Flower dissection and pollen growth germination

 G. Secondary and microelements with N-P-K tissue tests on plants

 H. Animal tract dissection

 I. Reproductive tract dissection

 J. Feed nutrient analysis

 K. Factors affecting photosynthesis

 L. Effects of leaf surface area, air movement, and light on transpiration rates

Effects of light quality on plant growth

Artificial insemination & embryo transfer

Phototropism

The Hydrologic Cycle

Comparison of soil vs. non-soil plant culture

Effects of nutrient concentrations on hydroponic plant growth

Effects of chemicals (herbicides) on plants

Herbicide biopsy

Effects of rooting hormone on root development

Balancing feed rations

Anther culture

DNA extraction

Probability of trait inheritance

Tissue culture

Seed disperal

Genetic probability

Insect identification

Environmental forcing structures

 Comparison of asexual propagation methods

 Water quality

Plant pigment chromatography