Agriculture Science I

Meets the UC “g” Admission Requirement

**I. COURSE INFORMATION:**

 A. Course Title: Agriculture Science I

 B. Grade Level: 9-12 Grades

 C. Length of Course: 1 year

 D. Prerequisites: Algebra I or Concurrent Enrollment

 E. Credit: 10 Units

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

A. The Agriculture Science I course is offered to first year agriculture students who are planning to major in agriculture in a college or university. The course is designed in conjunction with Agriculture Biology to meet UC requirements and California State Standards for Biological Sciences. It has been designed to provide students with a unique perspective of agriculture and its impact on American Society. It also provides students with critical thinking and leadership development skills via the Future Farmers of America (FFA), as well as foundation skills and knowledge in the seven program areas of agriculture.

B. The Agriculture Science I course is designed to be both academically challenging and demanding. Students will be expected to not only acquire knowledge, but also to organize, analyze, evaluate, predict, problem solve and apply this knowledge. The student must be able to read and comprehend a variety of materials; demonstrate writing skills that convey ideas in written and visual form; speak with clarity, meaning, and confidence, exhibit creativity; use technology in research and accessing information; appreciate and respect individual and cultural differences; and demonstrate the ability to work collaboratively.

**III. Major Objectives:**

1. The course objectives are as follows:

1. Define agriculture and the agricultural industry.

2. Describe important needs and sources of food and fibers.

3. Explain ecosystems and their impact on agriculture.

4. Explain the importance of standard measurements in agriculture.

5. Explain important characteristics of biological organisms.

6. Explain life span and its stages.

7. Explain heredity and genetics in agriculture.

8. Define plant and distinguish plants from animals.

9. Explain sexual and asexual propagation in plants.

10. Explain and understand the major organ systems of animals.

11. Name and describe the major animal groups.

12. Explain the food nutrients needed by animals and plants.

13. List examples of plant and animal classifications.

14. Understand health concerns and diseases of animals.

15. Learn leadership skills associated with the FFA

16. Develop an Supervised Agricultural Experience Project

17. Develop an understanding of data entry in record books.

## IV. Course Outline

A. Meeting Human Needs in a Changing World

 1. Define agriculture and agribusiness.

1. Describe how the agriculture industry meets human needs for

food, fiber, and shelter.

 3. Identify the origin of food and fiber items.

 4. Describe areas of the agriculture industry that affects our quality of life.

1. Contrast the interrelations of agriculture and society at the local, state, national, and international levels.
2. Economic impact of leading agricultural commodities.

B. Using Applied Sciences and Technology

1. Explain how the areas of Science relate to Agriscience.

2. Apply the scientific method.

3. Examine the laws and regulations concerning biotechnology.

4. Describe the role and uses of technology.

5. Understand public concern for technological advancements in agriculture, such as Genetically Modified Organisms (GMO’s).

C. Agriculture, the Environment and Earth’s Resources

1. Describe key agricultural environmental impacts on earth resources: soil, water, and air.

 2. Explain ecosystems and how they work.

 3. Understand current agricultural environmental challenges.

4. Compare and contrast practices for conserving renewable/non-renewable resources.

1. Explain pollution and identify sources of pollution.
2. Understand how new energy sources are developed from agricultural products

D. Using the Science of Computation

 1. Define the important terms and concepts in Agriscience

 measurements and computations.

 2. Explain the use and importance of standard measurement.

 3. Make measurements of length, temperature, and weights.

 4. Calculate area and volume of objects of various shapes.

E. Determining the Bases of Life

1. Understand the purpose and anatomy of cells

 2. Describe how cells parts function.

 3. Explain and describe various cell functions.

4. Describe the differences between plant and animal cells. 5. Describe the life processes in organisms.

 F. Classifying and Naming Living Things

 1. Describe the classification system for living things.

 2. Explain taxonomy.

 3. Use a classification key to identify leaves.

 4. Describe how classification systems are useful in

 agriscience and technology.

 G. Applying Plant Science Principles

1. Define plant science and how plants differ from animals.

 2. Label the parts of a plant and describe their functions.

 3. Explain the life cycle of a plant.

 4. Observe the effects of light on plant growth.

 5. Observe the effect of gravity on plant growth.

 H. Plant Propagation and Reproduction

 1. Explain the processes for the propagation of plants.

 2. Label the parts of a plant and explain their functions.

 3. Determine viability of seeds by using germination and

 vigor tests.

 4. Explain the importance of imported seeds.

I. Plant Growth and Nutrients

1. Explain factors and processes in plant growth.

2. Understand the photosynthesis process and the roles of the sun, chlorophyll, sugar, carbon dioxide, and water in the process.

3. Understand the anatomy and functions of plant systems and structures.

4. Explain the respiration process in food and organic matter breakdown.

 5. Describe annual, biennial, and perennial life cycles.

 6. Examine plant sexual and asexual reproduction.

J. Plant Insects and Pests

1. Understand the major classifications of pests.

2. Explain three conditions for pest problems.

3. Describe how pests affect plants and cause losses.

4. Examine the chemical, mechanical, cultural, and biological methods for plant pest control.

5. Explain the advantages and disadvantages of Integrated Pest Management (IPM).

6. List safety practices to follow in pest control.

K. Applying Animal Science Principles

1. Name and describe the major animal groups.

2. Describe the anatomy and physiology of animals.

3. Identify and explain the major organ systems of animals which include skeletal, nervous, circulatory, respiratory, excretory, digestive, reproductive, and mammary.

4. Understand the evolution and roles of domesticated animals.

5. Explain the differences between domestication and natural selection.

L. Animal Feeds and Nutrition

1. Examine the feed needs of animals.

2. Describe the feedstuffs that provide nutrients.

3. Explain the characteristics of good feed.

4. Understand animal feeding guidelines and evaluate sample feeding programs for various species.

1. Describe the types of nutrients required by farm animals.
2. Analyze suitable common feed ingredients for ruminant, monogastric, equine, and avian digestive systems, including roughages, concentrates, and supplements.

M. Animal Genetics and Reproduction

1. Differentiate between genotype and phenotype, and describe how

dominant and recessive genes function..

1. Compare and contrast genetic characteristics among different

breeds of farm animals.

1. Demonstrate how to display phenotype and genotype ratios by

utilizing a Punnett Square.

4. Expalin the fertilization process and the methods of insemination.

5. Understand the purpose and processes of mitosis and meiosis.

N. Animal Health and Diseases

1. Explain common animal health practices.
2. Understand the causes and control of common diseases.

3. Describe environmental influences of animal health.

4. List and examine the different types of animal diseases.

5. Describe the different types of injections.

O. Using Biotechnology to Improve Life

1. Describe biotechnology and how it is being used.

2. Identify issues associated with biotechnology.

3. Distinguish between two major areas of biotechnology.

4. List and explain examples of orgasmic biotechnology.

5. Describe the role of genetics, cells, and genomes in molecular biotechnology.

6. Describe the process of genetic engineering and the use of recombinant DNA.

7. Identify the areas of Agriscience being developed through genetic engineering.

P. Applying Principles of Soil Science

1. Describe the major soil components and types.

2. Explain the different ways that soil can be formed.

3. Understand how soil texture, structure, pH, and salinity affect plant growth.

4. Explain the different kinds of soil.

5. Explain the types, uses, and applications of soil amendments and fertilizers.

6. Explain the relation between soil and land.

Q. Marketing Technology in Agriscience

1. Describe the importance of agricultural marketing.

2. Explain ways agricultural products are marketed.

3. List and explain the major functions in agricultural marketing.

4. Describe the role of marketing infrastructure.

5. Explain the role of communication in agricultural marketing

 R. Computer Technology and Agriculture

1. Name five uses in agribusiness.

2. Name and explain the functions of the major external parts of the computer.

3. Demonstrate the use of a word processor.

4. Gain access to information highway through the internet.

S. Interpersonal Skills & Leadership Development (FFA)

1. Examine leadership traits in a leader.

2. Chart a short history and purposes of the FFA

1. List and describe the FFA degree requirements.

4. Explain and recite the FFA Creed.

5. List components of teamwork and cooperation.

1. Goal setting and creating the positive attitude.

7. Completion of a Supervised Agricultural Experience Project

T. Parliamentary Procedure & Law

1. Define Parliamentary Procedure.

2. Understand the basic concepts of Parliamentary Law.

3. Apply Parliamentary Law in a meeting setting.

4. Use effectively Parliamentary Law within a meeting.

U. Communication and Speaking Skills

1. List and describe the importance of public speaking skills.

2. Demonstrate the ability to lead a group discussion.

3. Describe the importance of being a good listener.

4. Demonstrate public speaking skills in selecting, researching and orally delivering a 5-10 minute presentation.

V. Agriculture Science Research Project

1. Development of an agriculture science project
2. Statistical management of project via Record Book
3. Instructional coordination and supervision
4. Analysis of project results

W. Professional Opportunities in Agriculture

1. Biotechnology & research fields

2. Other related agriculture science fields

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

Modern Biology 3rd Edition (Holt, Rinehart & Winston, 2004)

Laboratory Investigations in Biology (Holt, Rinehart & Winston, 2004)

Agriculture Biology Lab Manual Revised (Fullerton, 1999)

Biological Science Applications in Agriculture (Osborne, 1999)

 National FFA Organization (2004). Official Manual. Indianapolis, IN.

California FFA Association (2004). California Agriculture Record Book,

Sacramento, CA.

University of California, Davis & California Department of Education (2002).

Agriculture Model Curriculum Lesson Plans for Core I. CDE Press.

Sacramento, CA.

California Core Agriscience CD Lesson Plan Library (2004)

**VI. KEY ASSIGNMENTS:**

1. Research Paper on Agriculture Science
2. Seminar Presentation on Agriculture Science Practices
3. Development of Science Fair Project relating to Agriculture Science
4. Laboratory activities
5. Supervised Agricultural Experience Project & Record Book
6. FFA Leadership Participation

**VII. INSTRUCTIONAL METHODS:**

1. Lecture
2. Audio Visual Materials
3. Research Readings and Written Presentations
4. Homework Assignments
5. Group & Individual Activities
6. Laboratory Investigation – 1 per week (20% of grade)
7. Discussion & Group Dynamics
8. Quizzes, Tests & Final Exam
9. Guest Speakers
10. Field Trips
11. Internet Exploration
12. Seminar Presentation

**VIII.** **ASSESSMENT METHODS:**

A. Quizzes, Tests & Final Exam 40%

B. Laboratory Investigation & Write-ups 20%

C. Writing Assignments 10%

D. Leadership & Critical Thinking Activities 10%

E. Research Report and Seminar Presentation 10%

F. Supervised Agricultural Experience Project & Record Book 10%

**IX. LABORATORY ACTIVITIES:**

 A. The following laboratory activities will be incorporated:

* 1. The scientific method
	2. Using the microscope
	3. Using the dissecting microscope

 4. Introduction to lab exercises

 5. The effects of population shifts

 6. The effects of air pollution

 7. Water testing

 8. Root & stem anatomy

 9. Leaf anatomy

1. Flower anatomy
2. Pollination and fertilization
3. Sexual & asexual reproduction
4. Plant reactions to the environment
5. Soil testing
6. Soil erosion
7. Osmoses & diffusion investigation
8. Weed identification
9. Insect identification
10. Examination and diagram cells microscopically
11. Natural selection

17. Examine stained blood slides for form, function, parasites etc.

18. Simple digestion

19. Bacteria in Digestion

20. Parasites

21. Urinalysis – chemistry and morphology

22. Dilution and toxicity

23. Chemical mechanism of digestion

24. Chemistry analysis that identifies blood glucose levels

25. Chick embryo development

26. Normal system response

27. Fetal pig dissection

28. Effects of steroids on growth

29. Gene regulation

30. Manipulation of DNA

31. Genetic traits