

BSAA Course Outline

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Agricultural Education Program
College of Agricultural,
Consumer and Environmental Sciences
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Biological Science Applications in Agriculture (Plant and Animal Science)

Course Description

BSAA is a course that reinforces and extends students' understanding of science and the scientific process by associating scientific principles and concepts with relevant applications in agriculture. Students will examine specific agricultural applications and processes and the underlying science principles explaining or controlling those applications.

This course will use numerous laboratory exercises and experiments as the major tool of instruction. Students will also be required to develop two unique science experiments and run those experiments during the semester. Grading will mainly be based on laboratory reports over experiments conducted in the class but tests, quizzes and homework assignments will also be given.

Topics of instruction will include the major phases of plant growth and management in agriculture, the specific biological science concepts that govern management decisions, genetics, biotechnology, growth, development, reproduction, aquaculture, and processing of animal products. The FFA organization and Supervised Agricultural Experience Programs will also be covered in this course.

Course Goals and Objectives

- Understand the steps in conducting experimental research
- Discuss independent and dependent variables
- Discuss safety procedures
- Discuss laboratory report requirements
- Discuss scientific measurement
- Explain the nitrogen cycle
- Distinguish between grasses and legumes
- Discuss the water cycle
- Discuss organic fertilizers
- Discuss environmental pollutants
- Explain DNA, chromosomes, and genes

- Determine how genetic traits are passed on
- List the macronutrients and micronutrients necessary for plant growth
- Demonstrate soil testing and plant tissue testing
- Explain factors necessary for plant growth
- Discuss vegetative plant parts
- Determine how the environment effects plant growth
- Explain tropisms
- Distinguish between diffusion and osmosis
- Discuss photosynthesis and respiration
- Discuss plant pigments
- Determine the benefits of hydroponics
- Examine plant response to herbicide application
- Explain the different types of plant propagation
- Examine the parts of a flower
- Discuss handling, storing, and processing plant products
- Discuss animal research
- Understand animal genetics and probability
- Demonstrate DNA extraction
- Discuss animal nutrition
- Examine animal growth
- Explain animal behavior
- Determine animal health by looking at vital signs
- Discuss animal growth hormones
- Explain biotechnology
- Understand animal reproduction
- Explain artificial insemination
- Discuss aquaculture
- Discuss processing of animal products

Course Outline

The following outline lists both the plant and animal laboratories that are capable of being covered throughout the course of the year. Each laboratory will take approximately two-four weeks to complete. After the laboratory is conducted, students will be responsible for completing a laboratory report stating the findings of the experiment. Not every laboratory listed will be covered due to lack of time. Students will help to decide what experiments will be conducted based on interest.

PLANT SCIENCE

Unit I Conducting Scientific Investigation in Agriculture

Exploring Research Methods in Agriculture
Designing and Conducting Agricultural Research
Using Scientific Measurement

Unit II Agriculture and the Environment

Adopting Sustainable Agricultural Practices
Maintaining Water Quality
Effects of Pollutants on Plant Growth

Unit III Managing Inputs for Plant Growth

Principles of Heredity: Albinism in Corn
Principles of Heredity: Genetic Variation in Corn
Plant Tissue Testing
Rhizobium: The Nitrogen Fixer

Unit IV Initiating Plant Growth

Conducting the Warm Test and TZ Test for Seed Germination
The Role of the Embryo in Germination
Environmental Factors Affecting Seed Germination
Salinity and Seed Germination
Effects of Minimum Tillage on Seed Germination/Plant Growth
Osmotic Turgescence: The Forces of Plant Growth

Unit V Managing Plant Growth

Diffusion and Osmosis
Energy Transformation in Plants: Photosynthesis
Photosynthetic Efficiency of Different Colors of Light
Separating Plant Pigments by Chromatography
Transpiration in Plants
Homeostatic Responses of Seedling Plants: The Tropisms
Hydroponics
Plant Responses to Herbicide Applications
Differential Effects of Herbicides
Regulating Plant Growth

Unit VI Reproduction in Plants

Examining Parts of a Flower
Influence of Temperature on Pollen Germination
Tissue Culture

Unit VII Handling, Storing, and Processing Plant Products

Testing for Carbohydrates, Fats, and Proteins
Oxidative Rancidity
Controlling Molds with Food Preservatives
Testing for Food Additives
pH and Fermentation
Enzymatic Browning

ANIMAL SCIENCE

Unit 1 Scientific Investigation in Agriculture

Research in Animal Agriculture
Conducting Agricultural Research
Reporting Agricultural Research
Using Scientific Measurement

Unit II Animal Genetics and Biotechnology

Animal Genetics and Probability
DNA Extraction

Unit III Growth and Development of Animals

Chick Embryology
Hatching and Brooding of Chicks
Nutrition of Chicks
Animal Behavior-Peck Order of Chicks
Starch Digestion by Enzyme Action
Protein Digestion by Enzyme Action
Absorption of Nutrients
Vital Signs of Animals
Mycotoxins and Animal Health
Growth Hormones in Animals
Effect of Antibiotics on Bacteria
Testing for Mastitis

Unit IV Animal Reproduction

Artificial Insemination
Sperm Motility

Unit V Aquaculture

Effect on Temperature on Cold-Blooded Animals
Factors Affecting Dissolved Oxygen in Water
Microbial Cycling of Nitrogen

Unit VI Processing Animal Products

The Science of Meat Curing
Curing Ingredients in Meat Products
Water Binding in Meat
Salt as a Food Preservative
Pasteurized Milk as an Ecological System for Bacteria
Souring Milk
Yogurt Production

References/Supplies

Text: *Biological Science Applications in Agriculture*
Interstate Publishers, Inc.

Supplies: Each laboratory requires a different set of
materials.

Greenhouse: 30 X 60