

Lassen Community College Course Outline

AGR 20 Introduction to Plant Science

4.0 Units

I. Catalog Description

This course is an introduction to plant science including structure, growth processes, propagation, physiology, growth media, biological competitors, and post-harvest factors of food, fiber, and ornamental plants. This course has been approved for hybrid delivery.

Recommended Preparation: Successful completion of ENGL105 or equivalent multiple measures placement.

Transfers to both UC/CSU
General Education Area: A
CSU GE Area: B2
IGETC Area: 5B
C-ID AG-PS 106L
51 Hours Lecture, 51 Hours Lab
Scheduled: Spring

II. Coding Information

Repeatability: Not Repeatable, Take 1 Time
Grading Option: Graded or Pass/No Pass
Credit Type: Credit - Degree Applicable
TOP Code: 010300

III. Course Objectives

A. Course Student Learning Outcomes

Upon completion of this course the student will be able to:

Analyze and make recommendations to improve the various conditions (soil, climate, light, etc.) impacting the successful propagation of a specific plant species.

B. Course Objectives

Upon completion of this course the student will be able to:

1. Describe the scientific method and explain its application in solving problems in plant and soil science.
2. Discuss plant taxonomy.
3. Name and classify representative plants.
4. Categorize the roles of higher plants in the living world.
5. List and describe the structural components of higher plants.
6. Demonstrate the ability to successfully operate the monocular compound microscope.
7. Name the parts of a 'typical' cell and give the function of each part
8. Describe the unusual properties of water and relevance of those properties to the survival of plants.
9. Discuss the biological cycles involving nitrogen, carbon, water, oxygen, sulfur and phosphorous and interrelate each.
10. List and describe the 16 essential plant nutrients and their role in plant development.

11. Explain and demonstrate proficiency with the standard plant propagation methods.
12. Describe sexual and asexual reproduction in higher plants.
13. Define acid, base, and discuss the meaning of pH.
14. Diagram photosynthesis including energy relationships and matter into and out of system.
15. Explain respiration, and its role in higher plants.
16. Discuss the translocation of water, nutrients, and mineral in plants.
17. Explain Mendel's contribution to genetics.
18. List and describe genetic concepts in plant improvement.
19. Discuss the recent advances in genetic engineering as they relate to cultivated plants.
20. List and describe the physical and chemical properties of soils.
21. Hypothesize solution for soil erosion problems.
22. Describe the climatic influences on plant growth and development.
23. Categorize and explain the biological competitors of higher plants.

IV. Course Content

- A. The scientific method
 1. Developing a hypothesis
 2. Scientific design
 3. Application to plant/soil problems
- B. The role of higher plants in the living world
 1. Fossil fuels
 2. Food chains
 3. Industrial products
 4. Lower forms of plant life
- C. Structure of higher plants
 1. The life cycle of a plant
 2. The cell
 3. Cell structure
 4. The plant body
- D. Naming and classifying plants
 1. Climate
 2. Botanical names
 3. Botanical classifications
 4. Plant taxonomy
- E. Origin, domestication, and improvement of cultivated plants
 1. Origin of cultivated plants
 2. Domestication of plants
 3. Crop plants
 4. Germplasm
 5. Genetic concepts in plant improvement
- F. Propagation of plants
 1. Propagation methods
 2. Sexual propagation
 3. Vegetative propagation
- G. Vegetative and reproductive growth and development
 1. Vegetative growth and development

2. Reproductive growth and development
 3. Plant growth regulators
- H. Photosynthesis, respiration, and translocation
1. Photosynthesis
 2. Plant respiration
 3. Electron transport system
 4. Assimilation
- I. Soil and soil water
1. Factors involved in soil formation
 2. Physical properties of soil
 3. Chemical properties of soil
 4. Soil organisms
 5. Soil organic matter
 6. Soil water
 7. Water quality
- J. Soil and water management and mineral nutrition
1. Land preparation
 2. Irrigation
 3. Mineral nutrition
 4. Soil conservation
- K. Essential plant nutrients
1. 16 essential plant nutrients
 2. The effect of these nutrients on plants
 3. Soil and its relationship with nutrients
- L. Climatic influences on crop production
1. Climatic factors affecting plant growth
 2. Climatic requirements of some crop plants
 3. Weather and climate
 4. Climatic influences on plant diseases and pests
- M. Biological competitors of useful plants
1. Weeds
 2. Plant diseases
 3. Plant pests
 4. Nematodes
 5. Rodents
 6. Pesticide impacts on the environment

Laboratory Activities

1. Structure of higher plants
2. Naming and classifying plants
3. Propagation of plants
4. Vegetative and reproductive growth
5. Soil and water amendments
6. Fertilizers and plant nutrients
7. Application of the scientific method
8. Basic greenhouse management
9. Proper transplanting

V. Assignments

A. Appropriate Readings

Standard college level lecture and laboratory texts. Review of periodicals such as Capital Press, Stockman Grass Farmer and selected magazine articles.

B. Writing Assignments

These will include assigned problems related to crop management such as computational problem-solving demonstrations of level area, seeding rates and fertilizer rates, and paragraphs on various management situations stressing possible solutions to proposed problems.

C. Expected Outside Assignments

Homework assignments of specific management calculations, learning lecture materials, and textbook reading and review.

D. Specific Assignments that Demonstrate Critical Thinking

Lectures, discussions, and assignment will require students to develop the following critical thinking:

1. Develop a logical sequence for problem solving.
2. Categorize data to give results consistent to the goal.
3. Use data developed and collected to make management decisions consistent to pre-established goals.
4. E. Laboratory Assignments/Projects (Examples)
5. Dissection of a monocot seed and a dicot seed.
6. Identification of the parts of a cell in onion root tips under a microscope.
7. Identification of the three major soil particle types.
8. Observation of capillary water and how it moves through the soil.
9. Observation of the translocation of fluids in plants and how plants take up water.
10. Growth of plants in a deficient soil and study NPK deficiencies.
11. Dissection of plant organs (leaf, stems, roots, flowers, and fruits).
12. Demonstration of photosynthesis and aerobic cellular respiration through the capture end-products.

VI. Methods of Evaluation

Traditional Classroom Evaluation

1. Participation in classroom discussion.
2. Quizzes and examinations.
3. Homework assignments.
4. Midterm/Final examination.
5. Participation in laboratory assignments.

Hybrid Evaluation

All quizzes and exams will be administered during the in-person class time. Students will be expected to complete online assignments and activities equivalent to in class assignments and activities for the online portion of the course. Electronic communication, both synchronous and asynchronous (chat/forum) will be evaluated for participation and to maintain effective communication between instructor and students.

VII. Methods of Delivery

Check those delivery methods for which, this course has been separately approved by the Curriculum/Academic Standards Committee.

Traditional Classroom Delivery Correspondence Delivery

Hybrid Delivery Online Delivery

Traditional Classroom Delivery

1. Lecture
2. Laboratory
3. Guest Speakers
4. Instructor developed management problems
5. Quizzes and examinations which must be passed with minimum scores
6. Field trips

Hybrid Delivery

A combination of traditional classroom and online instruction will be utilized. Every semester, a minimum of 17 hours of class will be taught face-to-face by the instructor and the remaining hours will be instructed online through the technology platform adopted by the District. Traditional classroom instruction will consist of lectures, visual aids, discussions and group activities. Online delivery consists of instructor-generated information, readings, news communications, web links and activities as well as facilitation of forum based discussions and communications.

VIII. Representative Texts and Supplies

Bidlack; Jansky, *Sterns Introductory Plant Biology*, 15th edition, 2021, McGraw Hill, ISBN 9781260240832

Bidlack; Jansky. Stern; *Laboratory Manual for Sterns Introduction to Plant Biology*, 13th edition, 2013, McGraw Hill, ISBN: 9780077508784

IX. Discipline/s Assignment

Agricultural Production

X. Course Status

Current Status: Active

Original Approval Date: 2/27/1990

Revised By: Brian Wolf

Curriculum/Academic Standards Committee Revision Date: 11/03/2020

Revised for IPR, no change: 03/15/2022