BUTTE COLLEGE
COURSE OUTLINE

I. **CATALOG DESCRIPTION**

BIOL 12 - Botany **5 Unit(s)**

Prerequisite(s): Math Level V
Recommended Prep: Reading Level IV; English Level IV
Transfer Status: CSU/UC
51 hours Lecture
102 hours Lab

This course is intended for majors and covers comparative diversity, structure, and function of plant, fungal, and protistan phyla. Topics include development, morphology and physiology, taxonomy and systematics. Principles of population and community ecology and ecosystem interactions are emphasized. (C-ID BIOL 155).

II. **OBJECTIVES**

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

A. Recognize characteristics of plants, fungi, and photosynthetic protistans, and their phylogenetic relationships.
B. Construct and interpret phylogenies
C. Describe and contrast life cycles within and among major plant, fungal, and photosynthetic protistan taxa
D. Describe the structural organization of major plant, fungal, and photosynthetic protistan taxa.
E. Identify and describe plant structures and relate them to their functions, including transpiration, photosynthetic pathways, and energy and nutrient acquisition.
F. Describe how organisms are organized into and interact within and among populations and communities.
G. Describe the processes that occur within ecosystems including flow of energy, and the role of nutrient cycling in maintaining ecosystem integrity.
H. Provide evidence for evolution in plants and photosynthetic protistans.
I. Acquire, use and cite of scientific literature for scientific writing.
J. Apply scientific methodology and reasoning through active experimentation and experiences.
K. Demonstrate critical thinking and scientific reasoning skills

III. **COURSE CONTENT**

A. **Unit Titles/Suggested Time Schedule**

Lecture

Topics	Hours
1. Overview of the tree of life, and position of plant, fungal, and photosynthetic protistan taxa	4.25
2. Plant systems structure: anatomy (cell, tissue, organ)	4.25
3. Plant systems functions: physiology (including C3, C4 and CAM photosynthesis)	4.25
4. Plant development, hormones, regulation, reproduction and life cycles	4.25
5. Systematics and Taxonomy: classification schemes and plant speciation	4.25
6. Phylogeny/Evolutionary History of plant, fungal and photosynthetic protistan taxa	4.25
7. Introduction to Ecosystems, Population and Community Ecology	4.25

8. Population Ecology a. Population structure, growth, regulation, and fluctuation b. Intraspecific interactions	4.25
9. Community Ecology a. Interspecific interactions: Predator-prey relations, competition, symbiosis b. Community structure and succession	4.25
10. Ecosystem diversity (Biomes)	4.25
11. Ecosystems ecology: a. Trophic structure b. Energy flow c. Nutrient cycling and ecosystem integrity	4.25
12. Conservation and human interactions	4.25
Total Hours	51.00

Lab

Topics	Hours
1. Whole Plant Parts, Stems, Roots, Leaves	3.00
2. Microsope, Cells, Application of Scientific Method	3.00
3. Greenhouse Propagation, Experimental Design, Library Research Techniques	3.00
4. Diffusion, Osmosis, Plasmolysis	3.00
5. Plant Cell, Basic Structure, Physiology, Evolution	3.00
6. Leaf Cell Types, Tissues, Photosynthesis, Pigments	6.00
7. Roots and Stems, Cell types and Tissues	3.00
8. Vernal Pool Biology, Community Sampling, Data Collection, Analysis of Data	6.00
9. Stem Secondary Growth, Physiology	3.00
10. Transport, Hormones, Tropisms	9.00
11. Cell Divisions and Sexual Cycles, Comparison of Life Cycles	6.00
12. Classification, Cladistics, Mechanisms of Evolution	6.00
13. Protists Life Cycles, Diversity, Evolution	6.00
14. Comparative Study of Plant Life Cycles, Physiology and Diversity of: Bryophytes, Lower Vascular Plants, Gymnosperms, Angiosperms	15.00
15. Flower Variation, Evolution, Fruit Type Diversity	9.00
16. Fungal Life Cycles, Diversity	9.00
17. Ecology, Demographic Sampling, Vernal Pools, Riparian Zone, Measures of Species Richness, Population Growth Modeling	9.00
Total Hours	102.00

IV. **METHODS OF INSTRUCTION**

A. Lecture
B. Field Trips
C. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture

D. Discussion
E. Reading Assignments
F. Laboratory Experiments

V. METHODS OF EVALUATION

A. Exams/Tests
B. Quizzes
C. Written Assignments
D. Essays and research papers
E. Writing Requirement: Students will fulfill the 1500-word writing requirement by writing lab reports, field trip reports, research paper reviews, and essay questions on exams.

VI. EXAMPLES OF ASSIGNMENTS

A. Reading Assignments
   1. Read through the information provided regarding the origin of photosynthesis. Be prepared to discuss evolutionary advantages photosynthetic organisms exhibit.
   2. Read the text chapter discussing the origin of angiosperms. Be prepared to discuss the topic in class.

B. Writing Assignments
   1. Research angiosperm and gymnosperm life cycles. Write a 750 word paper comparing and contrasting these two life cycles.
   2. Research the effects of drought on plant transpiration. Write a 500 word paper summarizing your findings.

C. Out-of-Class Assignments
   1. Craft a detailed review of the steps of the scientific method as presented in a primary research paper from current literature. Student analysis will include a written synthesis for the instructor and an oral presentation to class. This project will be completed over a 6-week period. The instructor will review potential papers a student has selected, and will approve one before the student proceeds to the written report.
   2. Take home diagram of a plant leaf cross-section. Label the tissues, cells, and provide functions of each.

VII. RECOMMENDED MATERIALS OF INSTRUCTION

Textbooks:

A. Williams, M. and Fugle, G. Biology 12, Botany Lab Guide. Butte College Press, 2009.
B. Raven, et al.. Biology. 10th Edition. McGraw Hill, 2014.

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