

PALOMAR COLLEGE
COURSE OUTLINE OF RECORD FOR
DEGREE CREDIT COURSE

Transfer Course A.A. Degree applicable course
(check all that apply)

COURSE NUMBER AND TITLE: BOT 100, General Botany

UNITVALUE: 4

MINIMUM NUMBER OF SEMESTER HOURS: 96

BASIC SKILLS REQUIREMENTS: Appropriate language and computational skills

ENTRANCE REQUIREMENTS: None

PREREQUISITE: None

COREQUISITE: None

RECOMMENDED PREPARATION: None

SCOPE OF COURSE:

The diversity, structure, and function of major plant groups including cellular metabolism, soil-water relationships, classification, genetics, life cycle patterns, growth, and the basic ecological and evolutionary concepts of botany. *Not open to students with prior credit in BOT 101 or BOT 101L.* CSU; UC

SPECIFIC COURSE OBJECTIVES:

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

1. Compare and contrast the structure, function and reproduction of all plant groups;
2. Analyze the structure and function of cell organelles, cell types, and tissues associated with the angiosperm plant body;
3. Analyze the metabolic and growth processes which occur in plants;
4. Compare and contrast life cycles in non-vascular and vascular plants;
5. Evaluate mineral nutrition and soil-water relationships in plants;
6. Apply basic ecological and evolutionary principles to plant systems;
7. Analyze how genetic principles and the environment interact to control the phenotypic expression in plants;
8. Evaluate soil-water relationships in plants by experimentation;
9. Plant various seeds and plant parts to compare the growth of plants by sexual and artificial methods;
10. Apply genetic principles as they relate to plant systems by undertaking genetic experiments;
11. Collect, analyze and interpret scientific data.

CONTENT IN TERMS OF SPECIFIC BODY OF KNOWLEDGE:

I. Lecture Portion of Course

1. Introduction
 - A. Botany Defined
 - B. Subdivisions of Botany
 - C. Attributes of Living Systems
 - D. Autotrophic and Heterotrophic Nutrition
 - E. Classification of Living Organisms
2. Plant Diversity
 - A. Classification Systems
 - B. Salient Features of the Following Plant Groups
 - 1.) Bacteria
 - 2.) Algae
 - 3.) Fungi
 - 4.) Bryophytes
 - 5.) Ferns and Primitive Vascular Plants
 - 6.) Gymnosperms and Angiosperms
 - C. Symbiotic and Heterotrophic Plants
 - 1.) Parasitic and Carnivorous Angiosperms
 - 2.) Mutualism
 - 3.) Mycotrophs and Mycorrhizae
 - D. Convergent and Parallel Evolution
 - E. Phylogenetic Relationships
3. Cell Chemistry and Ultrastructure
 - A. Major Compounds of Living Systems
 - B. Organelles and Their Function
 - C. Enzyme Function and Control
 - D. Membrane Transport
 - 1.) Diffusion
 - 2.) Osmosis
 - 3.) Facilitated Diffusion
 - 4.) Active Transport
 - E. Cell Cycle
 - 1.) Mitosis
 - 2.) Cytokinesis
 - F. DNA Replication and Protein Synthesis
 - G. Genetic Engineering
4. Anatomy of Vascular Plants
 - A. Gross Morphology of the Stem
 - B. Development of Primary and Secondary Tissues
 - C. Plant Tissue Types
 - D. Monocot vs. Dicot Stem
 - E. Monocot vs. Dicot Root
 - F. Modified Stems and Roots
 - G. Leaf Structure
 - H. Guard Cells and Stomata
 - I. Anatomical Adaptations of Xerophytic and Hydrophytic Leaves and Stems
 - J. Leaf Modifications
 - K. Structure and Properties of Wood
 - L. Dendrochronology
 - M. Flower Morphology and Flower Types
 - N. Fruit Types
5. Plants and Water
 - A. Water Movement in Plants
 - B. Transpiration Pull-Cohesion Theory
 - C. Gravitational, Capillary and Hygroscopic water
 - O. Field Capacity, Storage Capacity and Wilting Percentage
 - E. Hydrophytic and Xerophytic Adaptations

- F. Turgor Pressure, Osmotic Pressure and Water Potential
- G. Opening and Closing of Stomata
- H. Plant Turgor Movement
- I. Mineral Nutrition and Indicators of Plant Diseases
- 6. Transformation of Energy
 - A. ATP: Energy Currency of Cell
 - B. Anaerobic Respiration, Glycolysis and Fermentation
 - C. Aerobic Respiration and Oxidative Phosphorylation
 - O. Chemosynthesis (Chemoautotrophic Bacteria)
 - E. Light Reactions of Photosynthesis
 - F. Dark Reactions of Photosynthesis
 - G. Dark Fixation of Carbon
 - H. C-4 and "CAM" Plants
- 7. Control of Growth and Development
 - A. Apical Dominance
 - B. Phototropism, Parthenocarpy, Abscission, Rooting, Chemotropism, Hydrotropism, and Geotropism
 - C. Plant Hormones: Natural and Artificial Auxins
 - D. Gibberellins, Cytokinins, Ethylene and Abscisic Acid
 - E. Turgor Movements
 - F. Dominancy versus Quiescence
 - G. Photoperiodism, Phytochromes and Floral Induction
- 8. Reproduction and Genetics
 - A. Asexual vs. Sexual Propagation
 - B. Meiosis and Genetic Variability
 - C. Mendelian Genetics
 - D. Crossing Over and Autosomal Linkage
 - E. Non-disjunction
 - F. Practical Applications: Selective Breeding and Colchicine
 - G. Hybridization, Polyploidy and Speciation
- 9. Life cycle Patterns
 - A. Representative Diplontic, Haplontic and Diplohaplontic Life Cycles
 - B. Alternation of Generations
 - C. Life Cycle of Algae, Bryophytes, Ferns, Gymnosperms and Angiosperms
 - D. Evolution of the Life Cycle Patterns
- 10. Plant Ecology
 - A. Terrestrial and Aquatic Ecosystems
 - B. Life Zones, Biomes and Plant Communities
 - C. Physical Environmental Factors
 - O. Biotic Environmental Factors
 - E. Energy Flow through Trophic Levels: Food Chains and Food Webs
 - F. Pyramids of Energy and Mass
 - G. Xerarch and Hydrarch Succession
 - H. Retrogression
 - I. Recycling of Nutrients
 - J. Nitrogen Fixation
 - K. The Continuum vs. Discrete Community
 - L. Amplitude of Tolerance and Naturalized Plants
 - M. Endemism
 - N. Quantitative Methods of Vegetation Sampling
 - 1.) Dominance
 - 2.) Density
 - 3.) Frequency
 - 4.) Importance values

II. Laboratory Portion of Course

1. Growing Plants in a Greenhouse
2. Enzymes
3. Use of Microscope

4. Osmosis and Diffusion
5. Respiration
6. Photosynthesis
7. Plant Cells and Tissues
8. Modified Leaves: Structure of Leaves and Roots
9. Herbaceous stems, Monocotyledonous stems, Woody Dicot stems, Coniferous Wood, Pine, Angiosperm Wood, Modified Stems
10. Water Movement, Growth and Development, Growth Hormones
11. Mitosis and Meiosis
12. Mendelian Genetics, DNA and Genetic Engineering
13. Bacteria and Bluegreen Algae, Green Algae, Diatoms and Plankton, Red and Brown Algae
14. Slime Molds, Lower Fungi, Ascomycetes, Lichens, Basidiomycetes
15. Liverworts and Mosses, Fern Allies, Ferns
16. Gymnosperms, Flower, Fruits and Seeds
17. Seed Germination and Seedling Development

REQUIRED READING:

Stern, K. Introductory Plant Biology. 8th edition. Dubuque: Wm. C. Brown Publishing Co., 2000.

Dean, H. L. Biology of Plants: Laboratory Exercises. 6th edition. Dubuque: Wm. C. Brown Publishing Co., 1987.

Supplemental published articles and laboratory exercises handed out during lecture and laboratory by the instructor.

Armstrong, W.P. Wayne's Word: A Newsletter Of Natural History Trivia.
<http://waynesword.palomar.edu>. 2002.

SUGGESTED READING:

In addition to the required course text, each instructor provides extensive supplemental material for the student's use. Supplemental material typically includes various texts in botany, extensive identification keys, research articles and materials, and instructor-generated course handouts. A student study guide is also available.

REQUIRED WRITING:

Students are required to write a 3 - 4 page term paper on a plant group and its importance to humans. In laboratory, students are required to maintain a written planting journal of 8 - 10 pages on four types of seeds and ten different plant parts to include cuttings, bulbs, cones, tubers, rhizomes, etc. Entries are typically records of weekly growth, drawings or photos of plants, growth curves and growth summaries. Students also complete lab exercises each week and submit essay type answers to each exercise.

OUTSIDE ASSIGNMENTS:

Students are expected to spend a minimum of three hours per unit per week in class and on outside assignments, prorated for short-term classes.

In addition to the required readings, students are expected to complete supplemental readings on the topics presented. Students shall integrate lecture and text material, as well as prepare themselves for examinations.

INSTRUCTIONAL METHODOLOGY:

Check all that apply:

- lecture
- laboratory
- lecture-laboratory combination
- directed study

DISTANCE LEARNING:

This course may be offered as a distance learning course and meets Title 5 regulations 55370, 55372, 55374, 55376, 55378, and 55380.

Yes No

If yes, check all that apply:

- Television Course (Video one-way, e.g. ITV, video cassette, etc.)
- Online Course (Text one-way, e.g. newspaper, correspondence, electronic file, etc.)
- Two-Way Video Conferencing (Two-way interactive video and audio)
- One-Way Video Conferencing (One-way interactive video and two-way interactive audio)
- Computer Assisted Instruction (A specialized form of mediated instruction relying primarily on student access to information and prepared lessons or teaching materials through a computer terminal, but not under immediate supervision of a qualified instructor.)

GRADING POLICY AND STANDARDS (include methods of determining whether the stated objectives have been met by students):

Students will be evaluated through five lecture exams, a planting journal, a term paper, practicum quizzes and weekly laboratory exercises:

- Lecture Exams 60% of grade
- Term Paper 10% of grade
- Planting Journal 10% of grade
- Lab Quizzes 10% of grade
- Lab Exercises 10% of grade

IS COURSE REPEATABLE FOR REASON(S) OTHER THAN DEFICIENT GRADE?

Yes No Number of times course may be taken for credit: 1

If yes, identify specific provision of Title 5 Division 2 section(s), 55761-55763 and 58161 which qualifies course as repeatable:

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SIGNATURES ON FILE