

**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 101 - General Botany Lecture

**UNIT VALUE:**      3

**MINIMUM NUMBER OF SEMESTER HOURS:** 48

**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 100.* CSU; UC

**SPECIFIC COURSE OBJECTIVES:**

Upon completion of this course, a successful student 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; and
7. Analyze how genetic principles and the environment interact to control the phenotypic expression in plants.

## CONTENT IN TERMS OF SPECIFIC BODY OF KNOWLEDGE:

- I. Introduction
  - A. Botany defined
  - B. Subdivisions of botany
  - C. Attributes of living systems
  - D. Autotrophic and heterotrophic nutrition
  - E. Classification of living organisms
- II. 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
- III. Cell Chemistry and Ultrastructure
  - A. Major compounds of living systems
  - B. Organelles and their function
  - C. Enzyme function and control
  - D. Membrane transport
    - 1. Simple diffusion
    - 2. Osmosis
    - 3. Facilitated diffusion
    - 4. Active transport
  - E. Cell cycles: mitosis and meiosis
  - F. DNA replication and protein synthesis
  - G. Genetic Engineering
- IV. Anatomy of Vascular Plants
  - A. Gross morphology of 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
- V. Plants and Water
  - A. Water movement in plants
  - B. Transpiration pull-cohesion theory
  - C. Gravitational, capillary and hygroscopic water
  - D. 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

- VI. Transformation of Energy
  - A. ATP: energy currency of cell
  - B. Anaerobic respiration, glycolysis and fermentation
  - C. Aerobic respiration and oxidative phosphorylation
  - D. Chemosynthesis (chemoautotrophic bacteria)
  - E. Light reactions of photosynthesis
  - F. Dark reactions of photosynthesis
  - G. Dark fixation of carbon
  - H. C-4 and "CAM" plants
- VII. 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. Dormancy versus quiescence
  - G. Photoperiodism, phytochromes and floral induction
- VIII. 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
- IX. Life cycle patterns
  - A. Representative diplontic, haplontic and diplohaplontic life cycles
  - B. Alternation of generations
  - C. Life cycle of algae, bryophytes ferns, primitive vascular plants, gymnosperms and angiosperms
  - D. Evolution of the life cycle patterns
- X. Plant Ecology
  - A. Terrestrial and aquatic ecosystems
  - B. Life zones, biomes and plant communities
  - C. Physical environmental factors
  - D. 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

**REQUIRED READING:**

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

Supplemental published articles handed out during lecture 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 students' use. Supplemental materials typically include various texts in botany; extensive identification keys; research articles and materials; and instructor generated course handouts. Student study guide which accompanies the book is also available.

#### **REQUIRED WRITING:**

Students are required to write a 3 to 4 page term paper on a plant group and its importance to humans.

#### **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):

Five lecture exams = 80% of grade  
One term paper = 20% 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:

**CONTACT PERSON:** Wayne P. Armstrong

<b>SIGNATURES ON FILE</b>
---------------------------