

Las Positas College
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Course Outline for BIO 1A

GENERAL BOTANY (FORMERLY BOTN 1)

Effective: Fall 2015

I. CATALOG DESCRIPTION:

BIO 1A — GENERAL BOTANY (FORMERLY BOTN 1) — 5.00 units

Plant structure and function, with emphasis on anatomy, morphology, and physiology of higher (flowering) plants. Includes evolutionary sequence of plant forms and basic principles of ecology.

3.00 Units Lecture 2.00 Units Lab

Prerequisite

MATH 55 - Intermediate Algebra for STEM
or

MATH 55B - Intermediate Algebra for STEM B
or

MATH 55Y - Intermediate Algebra

Strongly Recommended

BIO 30 - Intro to College Biology

Grading Methods:

Letter Grade

Discipline:

	<u>MIN</u>
Lecture Hours:	54.00
Lab Hours:	108.00
Total Hours:	162.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:

Before entering the course a student should be able to:

- A. MATH55
- B. MATH55B
- C. MATH55Y

Before entering this course, it is strongly recommended that the student should be able to:

- A. BIO30

IV. MEASURABLE OBJECTIVES:

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

- A. Recognize the evolutionary relationships among the major groups of plants;
- B. Make detailed and productive observations of plant structures, in both field and laboratory, and interpret their observations using principles learned in the course;
- C. Apply techniques and principles acquired in lecture and laboratory to correctly identify plants encountered on a daily basis, and place them in the appropriate major group (Division or Phylum);
- D. Apply physiological principles learned in the course to the growth and maintenance of plants;
- E. Describe current plant biotechnologies, their application to industrial agriculture, and possible environmental consequences;
- F. Identify major plant biomes of the world;
- G. Describe plants' roles in ecosystems and how worldwide environmental changes may affect these roles;
- H. Describe plant hormones and their uses in industrial agriculture.

V. CONTENT:

Lecture:

- A. Introduction to course
 - 1. characteristics of life
 - 2. plants compared to animals
 - 3. plant cell structure
- B. The plant body
 - 1. primary growth of stems: I. external morphology
 - 2. tissues and primary growth of stems: II. internal morphology
 - 3. leaves
 - 4. roots
 - 5. structure of woody plants: secondary growth
 - 6. flowers and reproduction
 - 7. reproduction and life-cycle patterns
 - 8. seed development
- C. Plant physiology
 - 1. history of photosynthesis study
 - 2. leaf structure and photosynthesis
 - 3. C-4 and CAM photosynthesis
 - 4. cellular respiration
 - 5. transport of water and nutrients: transpiration and translocation
 - 6. soils and mineral nutrition
 - 7. plant development and morphogenesis
 - 8. plant hormones
 - 9. external factors and plant growth
- D. An evolutionary survey of plants, algae, and fungi
 - 1. plant taxonomy and classification
 - 2. algae
 - 3. fungi
 - 4. lichens
 - 5. bryophytes
 - 6. seedless vascular plants
 - 7. gymnosperms—cone-bearing plants
 - 8. angiosperms—flowering plants
 - 9. evolution of the angiosperms
- E. Ecology
 - 1. community ecology
 - a. California plant communities
 - b. species interactions in communities
 - 2. ecosystem ecology
 - a. ecosystem dynamics and plant succession
 - 3. biomes
 - 4. population ecology
- F. Plants and humans
 - 1. agriculture and cultivated plants
 - 2. plants and the growth of the human population

Laboratory:

- A. The microscope
- B. Introduction to the vascular plant body
- C. Introduction to the cell
- D. The movement of substances into and out of cells
- E. Photosynthesis and respiration
- F. Fungi
- G. Protista I: water molds, slime molds, and unicellular algae
- H. Protista II: green, brown, and red algae
- I. Bryophytes
- J. Seedless vascular plants: the fern allies
- K. Seedless vascular plants: the fern
- L. Seed plants: the gymnosperms
- M. Seed plants: the angiosperms
- N. Fruits and fruits development
- O. Early development of the plant body
- P. Cells and tissues of the plant body
- Q. The root
- R. Primary structure of the stem
- S. The leaf
- T. Woody stems
- U. Wood: secondary xylem
- V. Growth regulators
- W. External factors and plant growth
- X. Inorganic nutrients required by plants
- Y. The movement of water and solutes in plants
- A@. Plant growth: SEEDLING (computer simulation exercises)
- AA. Ecology

VI. METHODS OF INSTRUCTION:

- A. **Lecture** -
- B. **Discussion** -
- C. **Field Trips** -
- D. **Projects** -
- E. Audio-visual materials

VII. TYPICAL ASSIGNMENTS:

- A. Identify plant species using field guide
- B. Field report on visit to wilderness area
- C. Reports on plant crossing and gibberellin experiments
- D. Transect of saltmarsh

VIII. EVALUATION:

A. Methods

1. Exams/Tests
2. Quizzes
3. Papers
4. Projects
5. Lab Activities
6. Other:
 - a. Methods
 1. Quizzes, midterm(s) and final examination
 2. Laboratory reports
 3. Laboratory practicums
 4. Student project or term paper

B. Frequency

1. Frequency
 - a. Quizzes weekly
 - b. Midterms 3 per semester
 - c. Final examination once per semester
 - d. Laboratory reports twice weekly
 - e. Laboratory practicums 4 per semester
 - f. Student project or term paper once per semester
2. Sample exam questions
 - a. Fill in the table below with the names and characteristics of the two major starch polysaccharides (not fructan or glycogen) and the two major structural polysaccharides we discussed in class.
 1. Polysaccharide: Glucose (alpha or beta?) Highly branched?
 - b. We discussed several plant pathogens. Under each pathogen, put a check mark if it can cause the disease symptom on the left.
 1. Virus Fungi Bacteria
 2. Wilting
 3. Discolorations
 4. Decreased growth
 - c. Casparian strip
 1. The region of the root where undifferentiated cells proliferate
 2. A ghost-like halo around stained hydrophilic cells
 3. A plant that sheds its outer coverings
 4. A hydrophobic band in the root cortex
 5. The middle east region where agriculture was first practiced
 - d. Explain briefly
 1. In what specific way do soils with large pore spaces benefit the plant?
 2. How the pits in tracheary elements protect the transpiration stream?
 3. How leaf discolorations can be used in the classification of plant nutrients as phloem mobile or phloem immobile?

IX. TYPICAL TEXTS:

1. Raven, P.H., R.F. Evert and S.E. Eichorn *Biology of Plants*. 6th ed., Worth, 1999.
2. Mauseth, J.D *An Introduction to Plant Biology*. 3rd ed., Saunders, 2003.
3. Young, P.G *The Botany Coloring Book.*, Barnes and Noble, 1982.
4. Balbach, M. and L.C. Bliss *A Laboratory Manual for General Botany.*, Saunders, 1991.
5. Van De Graff, K.M., S.R. Rushforth and J.L. Crawley *A Photographic Atlas for the Botany Laboratory*. 2nd ed., Morton, 1995.

X. OTHER MATERIALS REQUIRED OF STUDENTS: