Las Positas College
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Course Outline for BIO 1A

GENERAL BOTANY

Effective: Fall 2021

I. CATALOG DESCRIPTION:
BIO 1A — GENERAL BOTANY — 5.00 units

Diversity, structure and function of plant, fungal, and protistan phyla. Topics include development, morphology, physiology and systematics. Principles of population and community ecology and ecosystem interactions.

3.00 Units Lecture 2.00 Units Lab

Prerequisite
MATH 55 - Intermediate Algebra for BSTEM
with a minimum grade of C
or

MATH 55B - Intermediate Algebra for STEM B
with a minimum grade of C
or

NMAT 255 - Intermediate Algebra for BSTEM
with a minimum grade of C

Strongly Recommended
BIO 30 - Introduction to College Biology
with a minimum grade of C

Grading Methods:
Letter Grade

Discipline:
- Biological Sciences

	MIN
Lecture Hours:	54.00
Expected Outside of Class Hours:	108.00
Lab Hours:	108.00
Total Hours:	270.00

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
1. Recognize and determine the distinctions between relations and functions, numerically, graphically, symbolically, and verbally;
2. Solve polynomial, rational, absolute value, radical, linear, exponential, and logarithmic equations;
3. Apply basic operations on functions, including composition of functions and finding inverse functions;

B. MATH55B
1. Solve polynomial, rational, absolute value, radical, linear, exponential, and logarithmic equations;
2. Apply basic operations on functions, including composition of functions and finding inverse functions;

C. NMAT255
1. Recognize and determine the distinctions between relations and functions, numerically, graphically, symbolically, and verbally;
2. Solve polynomial, rational, absolute value, radical, linear, exponential, and logarithmic equations;
3. Apply basic operations on functions, including composition of functions and finding inverse functions;

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

A. BIO30
    1. Describe and apply the scientific method and how it is used by scientists to further scientific knowledge
    2. Cite the characteristics and levels of organization exhibited by all living organisms
    3. Know the use of light microscope and dissecting scope
    4. Describe how cells/specialized cells are structured and function
    5. Describe basic cell metabolism
    6. Describe/contrast, mitosis, and meiosis
    7. Describe structure, transmission and expression of genes
    8. Explain the Darwinian concept of evolution as modified by modern scientific knowledge
    9. Describe how the modern (binomial) system names and classifies organisms

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, fungi, and photosynthetic protistan taxa
B. Summarize evolutionary relationships using phylogenetic trees and build phylogenetic trees using morphological or molecular data
C. Make detailed and productive observations of plant structures, in both field and laboratory, and interpret their observations using principles learned in the course
D. Describe and contrast life cycles within and among major plant, fungal, and photosynthetic protistan taxa
E. 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
F. Describe plants' roles in ecosystems and how worldwide environmental changes may affect these roles
G. Explain diffusion, osmosis, osmoregulation and water balance at the cellular and organismal level
H. Describe plant hormones and their uses in industrial agriculture
I. Identify major plant biomes of the world
J. Apply physiological principles learned in the course to the growth and maintenance of plants
K. Describe how organisms are organized into and interact within and among populations and communities
L. Describe processes that occur within ecosystems including the flow of energy and nutrient cycling
M. Acquire, use, and cite scientific literature for scientific writing
N. Conduct a biology research project or experiment, and clearly convey the results using correct scientific format
O. Apply scientific methodology and reasoning through experimentation and experiences
P. Use a compound or dissecting microscope to identify organisms, tissues, and cell types
Q. Perform laboratory experiments in an efficient, safe, and purposeful manner

V. CONTENT:

A. Introduction to course
    1. Characteristics of life
    2. Plants compared to animals
B. Plant structure and anatomy of cells, tissues, and organs
    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. Seed development
C. Plant function and physiology
    1. History of photosynthesis study
    2. Leaf structure and photosynthesis
    3. C-4 and CAM photosynthesis
    4. Transport of water and nutrients: transpiration and translocation
    5. Soils and mineral nutrition
    6. Plant development and morphogenesis
    7. Plant hormones
    8. External factors and plant growth
D. An evolutionary survey of plants, algae, and fungi
    1. Plant taxonomy and classification
    2. Reproduction and life cycles of plants, algae, and fungi
    3. Algae
    4. Fungi
    5. Lichens
    6. Bryophytes
    7. Seedless vascular plants
    8. Gymnosperms—cone-bearing plants
    9. Angiosperms—flowering plants
    10. Evolution of the angiosperms
E. Ecology
    1. Community ecology
        a. California plant communities
        b. Species interactions in communities
        c. Community structure
        d. Succession
    2. Ecosystem ecology
        a. Trophic structure
        b. Energy flow
        c. Nutrient cycling
    3. Biomes
    4. Population ecology
        a. Population structure, growth, regulation, and fluctuation
        b. Intraspecific interactions
    5. Conservation biology
F. Plants and humans
    1. Agriculture and cultivated plants
    2. Plants and the growth of the human population

VI. LAB CONTENT:

A. Lab Safety
B. The microscope

C. Introduction to the vascular plant body
D. Introduction to the cell
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@. Ecology - competition and population biology
AA. Ecology - diversity and richness, field sampling
AB. Ecology - ecophysiology

VII. METHODS OF INSTRUCTION:
A. **Lecture** -
B. **Discussion** -
C. **Field Trips** -
D. **Projects** -
E. Audio-visual materials

VIII. TYPICAL ASSIGNMENTS:
A. Collection and analysis of population data
B. Field Report on visit to wilderness area
C. Reports on greenhouse experiment

IX. EVALUATION:
Methods/Frequency

A. Exams/Tests
Midterms 3 per semester and Final Exam
B. Quizzes
Weekly
C. Papers
Term paper once per semester
D. Projects
Student Project once per semester
E. Field Trips
Twice per semester
F. Class Participation
Weekly
G. Lab Activities
Twice weekly
H. Other
1. Laboratory practicums
a. 3 per semester
2. Laboratory reports
a. 3 per semester

X. TYPICAL TEXTS:
1. Kazmierski, Joel. *Exercises for the Botany Laboratory.* 2 ed., Morton Publishing Company, 2016.
2. Raven, Peter, George Johnson, Kenneth Mason, Jonathan Losos, and Tod Duncan. *Biology.* 12 ed., McGraw-Hill Publishing, 2017.
3. Mauseth, James. *Botany: An Introduction to Plant Biology.* 7 ed., Jones & Bartlett Learning, 2019.
4. Morris, James, Daniel Hartl, Andrew Knoll, Robert Lue, and Melissa Michael. *Biology: How Life Works.* 3 ed., W. H. Freeman and Company, 2019.
5. Rushforth, Samuel, Robert Robbins, John Crawley, and Kent Van De Graaff. *A Photographic Atlas for the Botany Laboratory.* 7 ed., Morton Publishing Company, 2016.
6. Mauseth, J. . Botany: A Lab Manual. 7th ed.. Jones & Bartlett Learning , 2019.

XI. OTHER MATERIALS REQUIRED OF STUDENTS: