

JEFFERSON COLLEGE

COURSE SYLLABUS

BIO205

GENERAL BOTANY

5 Credit Hours

Prepared by:
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Minor Revision or Update by: Fran Moore
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Ms. Linda Abernathy, Division Chair, Math, Science & Business
Ms. Shirley Davenport, Dean, Arts & Science Education

BIO205 General Botany

I. CATALOG DESCRIPTION

- A. Prerequisites:
- High school biology and chemistry or equivalent (BIO101), with a grade of “C” or better within the previous five years of registration date
 - Reading proficiency.
- B. 5 semester credit hours
- C. General Botany deals with structure, function, and organization of plant life. This course includes a survey of the plant kingdom and identification of common native plants. Laboratory time is required.
(F)
- D. Curricular alignment:
- Fulfills part of Natural Sciences (Biological Sciences) with lab CORE requirement for AA, AAT, AFA, and select AAS degrees: MOTR BIOL 150L Biology with Lab.
 - Elective course applies toward AA or AAT degree.

II. EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT MEASURES

Expected Learning Outcomes	Assessment Measures
Define basic ecological terminology; students will demonstrate knowledge of the flow of energy and nutrients through an ecosystem; students will identify the earth’s biomes and compare the characteristics of each one	Classroom lecture, classroom discussion, exam, viewing a DVD, and laboratory activities
Distinguish between major and minor organic compounds found in plants; student will recognize the similarities and differences of the organic compounds; students will investigate the characteristics of selected organic compounds	Classroom lecture and discussions, exam, and laboratory activities
Differentiate between prokaryotic and eukaryotic cells; students will identify cellular organelles and describe the function of each; students will diagram the structure of the cell membrane; students will differentiate between active and passive transport processes and osmosis and diffusion; students will predict the resulting changes to be exhibited in plant cells placed in different tonic solutions	Classroom lecture, classroom discussion, and laboratory activities

<p>Compare and contrast mitosis and meiosis; students will recognize the different stages of cell cycle (mitosis and meiosis); students will investigate mitosis in the root of a plant</p>	<p>Classroom lecture, classroom discussion, exam, and laboratory activities</p>
<p>Differentiate between aerobic and anaerobic respiration/fermentation; students will know the processes occurring during aerobic respiration; students will compare and contrast the types of anaerobic respiration/fermentation; students will investigate the process of respiration in corn</p>	<p>Classroom lecture, classroom discussion, exam, and laboratory activities</p>
<p>Know the equation for photosynthesis, the role of the reactants in the photosynthetic process, and the role of the products in the plant and the ecosystem; students will illustrate the process of the light dependent reaction; students will distinguish between the light dependent reaction and the light independent reactions; students will differentiate between three light independent reactions and types of plants that employ each strategy; students will investigate photosynthesis in living plants</p>	<p>Classroom lecture, classroom discussion, exam, and laboratory activities</p>
<p>Know the structure and function of deoxyribonucleic acid (DNA); students will examine the major events and scientists associated with the discovery of DNA; students will illustrate the process of DNA replication; students will compare and contrast DNA and ribonucleic acid (RNA); students will distinguish between the different the steps of protein production; students will perform an experiment comparing DNA isolation techniques two in plants</p>	<p>Classroom lecture, classroom discussion, exam, viewing a DVD, and laboratory activities</p>
<p>Identify the major structures found in the roots, stems and leaves of plants; students will compare and contrast the functions of the major structures in the roots, stems and leaves; students will distinguish between asexual and sexual reproduction in plants; students will know the major process that occur during sexual reproduction in plants; students will recognize the different behaviors displayed by plants</p>	<p>Classroom lecture, classroom discussion, exam, viewing a DVD, and laboratory activities</p>

Know Mendelian genetics and the relevant associated genetic terminologies; students will perform various genetics problems; students will differentiate between monohybrid and dihybrid crosses; students will differentiate between traits that follow Mendelian genetics with those that do not in plants	Classroom lecture, classroom discussion, homework, laboratory activities, and exam
Distinguish between the various scientists, including but not limited to Darwin and Wallace, involved in the development of the Theory of Evolution; students will differentiate between the various causes of evolution; students will distinguish between the various types of evolution; students will identify the different types of speciation	Classroom lecture, classroom discussion, and exam
Demonstrate the ability to identify native plants using information presented during class, on the internet, in field guides or a plant key	Student plant collections
Demonstrate the ability to formulate hypotheses and carry out various experiments to test the hypotheses	Laboratory activities
Demonstrate the ability to identify characteristics of leaves, flowers and fruits	Laboratory activities and laboratory exam
Examine the medicinal uses of plants.	Laboratory activities, viewing of two DVDs, and a field trip to the Missouri Botanical Gardens
Recognize various plant species by either by the leaves, twigs or flowers	Laboratory activities and laboratory exams
Explore and then explain the historical significance of four plants: the apple, the tulip, marijuana and the potato, from the book <i>The Botany of Desire</i>	Writing assignments for each plant, based on reading each chapter, followed by watching the DVD <i>The Botany of Desire</i> , during lab

III. COURSE OUTLINE

- A. Introduction: sub-disciplines in botany
- B. Ecology
 1. Ecological terminology
 2. Energy flow in ecosystems
 3. Autotrophs vs. heterotrophs
 4. Trophic levels
 5. Gross primary productivity (GPP)
 6. Net primary productivity (NPP)
 7. Secondary productivity

8. Factors effecting productivity
9. Food chains vs. food webs
10. Biogeochemical cycles (carbon, nitrogen, phosphorus and water)
11. Human effects on biogeochemical cycles
12. Biomes
13. Human effects on the biomes

C. Organic compounds

1. Chemical composition and structures of carbohydrates
2. Classes of carbohydrates and examples of each
3. Locations and functions of carbohydrates in plants
4. Chemical composition and structure of lipids
5. Types of lipids
6. Locations and functions of lipids in plants
7. Chemical composition and structure of proteins
8. Amino acid components
9. Types of amino acids
10. Classification of proteins
11. Locations and functions of proteins in plants
12. Types of proteins
13. Chemical composition and structure of nucleic acids
14. Nucleotide components
15. Function of adenosine triphosphate (ATP)
16. Function of deoxyribonucleic acid (DNA)
17. Function of ribonucleic acid (RNA)
18. Examples and functions of secondary compounds

D. Cytology

1. Cell theory
2. Structure and function of plant cell organelles
3. Cell membrane physiology
4. Cell division

E. Cellular respiration

1. Glycolysis
2. Aerobic respiration
3. Anaerobic respiration
4. Cell respiration in corn

F. Photosynthesis

1. Equation: role of reactants and products
2. Global climate change
3. Ozone layer
4. Skin cancer
5. Solar radiation

6. Chloroplast structure
 7. Pigments
 8. Light dependent reaction
 9. Light independent reactions
- G. Deoxyribonucleic acid
1. Structure
 2. Discovery of the DNA double helix
 3. DNA replication
 4. Protein production: transcription vs. translation
 5. DNA fingerprinting
 6. DNA isolation
- H. Plant Structure
1. Types of tissues
 2. Structure and function of roots
 3. Structure and function of the shoot: stems and leaves
 4. Primary growth vs. secondary growth
 5. Stem and leaf modifications
- I. Plant reproduction
1. Asexual/vegetative reproduction
 2. Gymnosperm reproduction
 3. Angiosperm reproduction
- J. Plant behavior
1. Plant hormones
 2. Response to stimuli
- K. Genetics and heredity
1. Gregor Mendel
 2. Monohybrid cross
 3. Test cross
 4. Independent assortment
 5. Dihybrid cross
 6. Incomplete dominance
 7. Codominance
 8. Multiple alleles
 9. Multiple genes
 10. Epistasis
 11. Lethal alleles
 12. Linkage
 13. Pleiotrophy
 14. Environment and phenotypic expression
 15. Autosomes
 16. Sex chromosomes

- L. Evolution
 - 1. Definitions
 - 2. Spontaneous generation
 - 3. Special creation
 - 4. Inheritance of acquired characteristics
 - 5. Charles Darwin
 - 6. Alfred Russel Wallace
 - 7. Causes of evolution
 - 8. Types of evolution
 - 9. Speciation
 - 10. Extinction

M. Scientific Method: herbal remedies

- N. Plant identification
 - 1. Leaves
 - 2. Flowers and fruits
 - 3. Twigs
 - 4. Missouri wildflowers
 - 5. Plant keys
 - 6. Plant collection
 - 7. Individual collection
 - 8. Medicinal plants

IV. METHODS OF INSTRUCTION

- A. Lecture
- B. PowerPoint presentations
- C. Campus identification of plants
- D. Class discussion
- E. Laboratory exercises
- F. Field Trip to the Missouri Botanical Gardens
- G. DVDs

V. REQUIRED TEXTBOOKS

- A. Graham, L. E., & Graham, J. M. *Plant biology* (current edition). Upper Saddle River, NJ: Pearson/Prentice Hall.
- B. Denison, E. *Missouri wildflowers: a field guide to the wildflowers of Missouri* (current edition). Jefferson City, MO: Missouri Department of Conservation.

- C. Tekiela, S. *Trees of Missouri: field guide*. Cambridge, MN: Adventure Publications.
- D. Pollan, M. *The botany of desire: a plant's eye view of the world*. New York: Random House.

VI. REQUIRED MATERIALS

No materials required

VII. SUPPLEMENTAL REFERENCES

No supplemental references required

VIII. METHODS OF EVALUATION

A. Distribution of final grade

Students are evaluated by five hourly exams, two laboratory exams, a comprehensive final exam, laboratory exercises, a plant collection, a field trip to the Missouri Botanical Gardens, and *Botany of Desire* writing assignments.

B. Assignment of final letter

grades 90-100% = A
80-89% = B
70-79% = C
60-69% = D
Below 60% = F

C. Attendance policy

Student attendance is mandatory. There are no excused absences. If a student misses more than 15% of the total time (including lecture and laboratory) that the class meets in a semester, the student may be prohibited from attending the class by the instructor. In such cases, the student must officially withdraw from the course, by the designated withdrawal date, in order to reduce the possibility of receiving an "F" for the course.

No make-up exams are given, however students are allowed to drop their lowest grade on one of the hourly tests or the final exam so if they are absent on a test day, the missed test is automatically dropped. Students arriving more than 10 minutes late will not be allowed to take the test and that test grade will be dropped. Any additional missed tests/late arrivals will result in a grade of zero and the test grade will not be dropped.

Students arriving late to lab will not be allowed to participate in the laboratory activity and will receive a grade of zero. Students that leave lab before the successful completion of the lab will also receive a grade of zero. Laboratory exercises and laboratory exams cannot be made up.

IX. ADA AA STATEMENT

Any student requiring special accommodations should inform the instructor and the Coordinator of Disability Support Services (Library phone 636-481-3169)

X. ACADEMIC HONESTY STATEMENT

All students are responsible for complying with campus policies as stated in the Student Handbook (see College website, <http://www.jeffco.edu>).

XI. ATTENDANCE STATEMENT

Regular and punctual attendance is expected of all students. Any one of these four options may result in the student being removed from the class and an administrative withdrawal being processed: (1) Student fails to begin class; (2) Student ceases participation for at least two consecutive weeks; (3) Student misses 15 percent or more of the coursework; and/or (4) Student misses 15 percent or more of the course as defined by the instructor. Students earn their financial aid by regularly attending and actively participating in their coursework. If a student does not actively participate, he/she may have to return financial aid funds. Consult the College Catalog or a Student Financial Services representative for more details.

XII. OUTSIDE OF CLASS ACADEMICALLY RELATED ACTIVITIES

The U.S. Department of Education mandates that students be made aware of expectations regarding coursework to be completed outside the classroom. Students are expected to spend substantial time outside of class meetings engaging in academically related activities such as reading, studying, and completing assignments. Specifically, time spent on academically related activities outside of class combined with time spent in class meetings is expected to be a minimum of 37.5 hours over the duration of the term for each credit hour.