JEFFERSON COLLEGE

COURSE SYLLABUS

BIO 205

GENERAL BOTANY

5 Credit Hours

Prepared by:
Dora Mitchell

Revised Date:
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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. Course pre-requisites/co-requisites:
   High school biology and chemistry or equivalent
   BIO101 (General Biology) 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 the 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)

II. EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT MEASURES

<table>
<thead>
<tr>
<th>Expected Learning Outcomes</th>
<th>Assessment Measures</th>
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<tbody>
<tr>
<td>Define basic ecological terminology; students will demonstrate knowledge of the</td>
<td>Classroom lecture, classroom discussion, exam, viewing a DVD, and laboratory activities</td>
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<td>flow of energy and nutrients through an ecosystem; students will identify the earth’s</td>
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<td>biomes and compare the characteristics of each one</td>
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<tr>
<td>Distinguish between major and minor organic compounds found in plants; student will</td>
<td>Classroom lecture and discussions, exam, and laboratory activities</td>
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<td>recognize the similarities and differences of the organic compounds; students will</td>
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<td>investigate the characteristics of selected organic compounds</td>
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<tr>
<td>Differentiate between prokaryotic and eukaryotic cells; students will identify</td>
<td>Classroom lecture, classroom discussion, and laboratory activities</td>
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<td>cellular organelles and describe the function of each; students will diagram the structure</td>
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<td>of the cell membrane; students will differentiate between active and passive transport</td>
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<td>processes and osmosis and diffusion; students will predict the resulting changes to be</td>
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<td>exhibited in plant cells placed in different tonic solutions</td>
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<tr>
<td>Compare and contrast mitosis and meiosis; students will recognize the different stages</td>
<td>Classroom lecture, classroom discussion, exam, and laboratory activities</td>
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<td>of cell cycle (mitosis and meiosis); students will</td>
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<td>Topic</td>
<td>Activities</td>
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<td>Investigate mitosis in the root of a plant</td>
<td>Classroom lecture, classroom discussion, exam, and laboratory activities</td>
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<tr>
<td>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</td>
<td>Classroom lecture, classroom discussion, exam, and laboratory activities</td>
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<tr>
<td>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</td>
<td>Classroom lecture, classroom discussion, exam, and laboratory activities</td>
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<tr>
<td>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 steps of protein production; students will perform an experiment comparing DNA isolation techniques two in plants</td>
<td>Classroom lecture, classroom discussion, exam, viewing a DVD, and laboratory activities</td>
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<tr>
<td>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</td>
<td>Classroom lecture, classroom discussion, exam, viewing a DVD, and laboratory activities</td>
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<tr>
<td>Know Mendelian genetics and the relevant associated genetic terminologies; students will perform various genetics problems; students will differentiate between</td>
<td>Classroom lecture, classroom discussion, homework, laboratory activities, and exam</td>
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monohybrid and dihybrid crosses; students will differentiate between traits that follow Mendelian genetics with those that do not in plants

<table>
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<tr>
<th>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</th>
<th>Classroom lecture, classroom discussion, and exam</th>
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<tbody>
<tr>
<td>Demonstrate the ability to identify native plants using information presented during class, on the internet, in field guides or a plant key</td>
<td>Student plant collections</td>
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<td>Demonstrate the ability to formulate hypotheses and carry out various experiments to test the hypotheses</td>
<td>Laboratory activities</td>
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<td>Demonstrate the ability to identify characteristics of leaves, flowers and fruits</td>
<td>Laboratory activities and laboratory exam</td>
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<td>Examine the medicinal uses of plants.</td>
<td>Laboratory activities, viewing of two DVDs, and a field trip to the Missouri Botanical Gardens</td>
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<tr>
<td>Recognize various plant species by either by the leaves, twigs or flowers</td>
<td>Laboratory activities and laboratory exams</td>
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<td>Explore and then explain the historical significance of four plants: the apple, the tulip, marijuana and the potato, from the book <em>The Botany of Desire</em></td>
<td>Writing assignments for each plant, based on reading each chapter, followed by watching the DVD <em>The Botany of Desire</em>, during lab</td>
</tr>
</tbody>
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### 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. Pleiotropy
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. METHOD(S) 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 TEXTBOOK(S)


VI. REQUIRED MATERIALS

No materials required

VII. SUPPLEMENTAL REFERENCES

No supplemental references required

VIII. METHOD 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/jeffco/index.php?option=com_weblinks&catid=26&Itemid=84)

XI. ATTENDANCE STATEMENT

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.