

Syllabus

CODE: BIOL 102

TITLE: General Biology II

DIVISION: STEM

DEPARTMENT: Biology

COURSE DESCRIPTION: Through laboratory exercises and classroom experiences the student will demonstrate the ability to identify and interpret basic biological concepts related to the evolution, behavior, unity and diversity and ecology of living organisms. This course, together with BIOL 101, serves as an initial sequence for further studies in the biological sciences.

PREREQUISITE: A grade of "C" or higher in BIOL 101

PREREQUISITES OR COREQUISITES:

COREQUISITES:

CREDITS: 4

LECTURE CREDITS: 3

LAB/STUDIO CREDITS:

LAB/STUDIO HOURS: 3

REQUIRED MATERIALS:

Refer to the Brookdale Bookstore Website for text requirements: <https://www.brookdalecc.edu/college-store/>

ADDITIONAL TIME REQUIREMENTS:

Additional time in the Independent Study Laboratory (MAS 041) is usually required for successful completion of the course.

COURSE LEARNING OUTCOMES:

- Demonstrate understanding and application of biological classification schemes representing the unity and diversity of life.
- Examine the anatomical and morphological features of representative species from various taxonomic groups.
- Investigate the inter-relationships of organisms, the environment, and energy at the population, community and ecosystem levels.
- Identify the theories that explain the possible origin of life on earth and the processes that have transformed life into the vast diversity present today.
- Employ the scientific method of inquiry to gather and use information for the express purpose of critical thinking, information analysis and problem solving.

GRADING STANDARD:

A student must have an average of 65% or higher for the classroom component and an average of 65% or higher for the laboratory component of the course in order to earn a passing grade for the course.

Upon completion of the course, grades will be assigned as follows:

A = 92 - 100%
A- = 89 - 91%
B+ = 86 - 88%
B = 82 - 85%
B- = 79 - 81%
C+ = 76 - 78%
C = 70 - 75%
D = 65 - 69%
F = <65%

Unit examination results will be reported as the grade assigned by the faculty calculated to the first decimal place. These grades will be weighed according to course grading policy. In calculating the course grade, 0.5 will round up to the next numerical grade and 0.4 will round down to the next lower numerical grade.

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A grade of C or higher is required in all pre-requisite courses. Career studies courses must have a grade of C or higher to count toward the Mathematics / Science Program – Biology Option.

Students are permitted to withdraw from the course without penalty until approximately 80% of the semester is complete. Please see term schedule for the exact deadline.

At the end of the semester, application for an Incomplete may be made if a student with proper documentation needs to complete no more than one lecture exam and/or one laboratory practical. The granting of an Incomplete is at the discretion of the instructor. (Please see Instructor's syllabus for additional Grading Policies.)

COURSE CONTENT:

Unit One:	Classification, Viruses and Monera
Unit Two:	Kingdom Protista
Unit Three:	Kingdom Fungi
Unit Four:	Kingdom Plantae
Unit Five:	Kingdom Animalia
Unit Six:	Ecology
Unit Seven:	Evolution

DEPARTMENT POLICIES:

Attendance during class and laboratory sessions is strongly recommended for optimum performance in biology courses.

Lecture exams will be given in class or in the Testing Center, depending on instructor preference.

Laboratory practicals will be given during laboratory sessions, in accordance with schedules provided by the learning assistants. Exams and practicals must be taken at the times designated by the instructor or learning assistant. A student who misses a lecture exam or laboratory practical must provide prior notification and proper documentation in order to take the exam or laboratory practical. The acceptance of said prior notification and proper documentation will be determined by the instructor.

Documentation must be provided within one week of the student's return to the classroom for a make-up exam or laboratory practical to be scheduled. A student who is unable to provide proper documentation for a missed exam or laboratory practical will be given a grade of zero for that exercise. Students may not re-take exams or laboratory practicals on which they perform poorly.

Requirements for the completion of laboratory are listed in the laboratory responsibility sheets for individual courses. Requirements for course completion are listed in individual instructor syllabi.

COLLEGE POLICIES:

As an academic institution, Brookdale facilitates the free exchange of ideas, upholds the virtues of civil discourse, and honors diverse perspectives informed by credible sources. Our College values all students and strives for inclusion and safety regardless of a student's disability, age, sex, gender identity, sexual orientation, race, ethnicity, country of origin, immigration status, religious affiliation, political orientation, socioeconomic standing, and veteran status. For additional information, support services, and engagement opportunities, please visit www.brookdalecc.edu/support/

For information regarding:

- ◆ Brookdale's Academic Integrity Code
- ◆ Student Conduct Code
- ◆ Student Grade Appeal Process

Please refer to the **STUDENT HANDBOOK AND BCC CATALOG.**

NOTIFICATION FOR STUDENTS WITH DISABILITIES:

Brookdale Community College offers reasonable accommodations and/or services to persons with disabilities. Students with disabilities who wish to self-identify, must contact the Disabilities Services Office at 732-224-2730 or 732-842-4211 (TTY), provide appropriate documentation of the disability, and request specific accommodations or services. If a student qualifies, reasonable accommodations and/or services, which are appropriate for the college level and are recommended in the documentation, can be approved.

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ADDITIONAL SUPPORT/LABS:

Students enrolled in BIOL 102 have access to the Science Computer Laboratory (MAS 019) and the Independent Study Laboratory (MAS 041).

MENTAL HEALTH:

- Mental Health Crisis Support: From a campus phone, dial 5555 or 732-224-2329 from an external line; off-hours calls will be forwarded to BCC police (2222 from a campus phone)
- Psychological Counseling Services: 732-224-2986 (to schedule an appointment during regular hours)

Course Website:

Biology Department information and BIOL 102 resources are available on the Brookdale website:

<http://www.brookdalecc.edu/pages/802.asp>

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BIOL 102
Course #

General Biology II
Title

1 of 7 Units

4
Credits

Name of Unit: **Classification, Viruses and Monera**

Unit Objective: The student will demonstrate understanding of the classification of living organisms, and will be able to describe the characteristics of viruses and prokaryotes citing examples and explaining key concepts.

Textbook: BIOLOGY by Urry et al., - 11th edition - Chapters 1, 19, 22, 24, 26, 27

Method of Evaluation: Unit Exam and Laboratory Practical

Estimated Time To Achieve: Three Weeks

<u>Learning Objectives</u>	<u>Recommended Learning Experiences</u>
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The Student Will Be Able To:

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| <ol style="list-style-type: none"> 1. Define taxonomy; distinguish between taxon and category and review levels of biological organization. Describe the concept of species. 2. Describe the monophyletic ideal. 3. Describe the two, three, and five kingdom classification systems, and the three domains. 4. Describe Linnaeus' system of binomial nomenclature and correctly write scientific names of sample organisms. 5. Differentiate homology from analogy contrasting convergent evolution and adaptive radiation (divergent evolution). 6. Describe molecular systematics as a tool used in taxonomy. 7. Explain cladistics and demonstrate an understanding of phylogenetics and cladograms. 8. Describe the structure of viruses to include genome, capsid and envelope. 9. Describe viral replication and discuss the classification of viruses. 10. Describe the life cycle of a retrovirus. 11. Describe and discuss the lytic and lysogenic cycles of bacteriophages. 12. Discuss the impact of viruses on plants and humans, especially emerging viral strains. 13. Describe prions and viroids. 14. Describe prokaryote structure to include cell membrane, genome, | <p>Class Discussion
Textbook Readings:
Pages:
4-5, 505 and 552</p> <p>557-558 (Fig. 26.10a)</p> <p>12-13, 552 and 566-567</p> <p>468 and 552-553</p> <p>477-479 and 540-542</p> <p>556-563</p> <p>558-560</p> <p>397-399 (Fig. 19.3)</p> <p>399-406 (Figures 19.4 & 19.8)
(Table 19.1)</p> <p>404-405 (Fig. 19.9)</p> <p>400-402 (Figures 19.5 & 19.6)</p> <p>404-410</p> <p>410-411</p> <p>572-575</p> |
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nucleoid region, cytoplasm and ribosomes.

15. Differentiate Gram positive from Gram negative bacteria based on chemical composition of the cell wall. 572-573 (Fig. 27.3)
16. Describe flagella and pili (fimbriae) as specializations for locomotion and attachment; differentiate each from similar eukaryotic structures. 573-574 (Figures 27.6 & 27.7)
17. Describe the three principle bacterial forms: cocci, bacilli and spiral bacteria. 572 (Fig. 27.2)
18. Describe binary fission as the mode of prokaryotic reproduction. 242-243 and 575-576 (Fig. 12.12)
19. Describe transformation, conjugation and transduction as mechanisms of transfer of genetic material in prokaryotes. Describe the significance of endospores. 315, 573, 577-579 (Fig. 27.9) (Figures 16.2, 27.5, 27.11, 27.12 & 27.13)
20. Describe the metabolic diversity of the prokaryotes, to include sources of energy and oxygen and pH requirements. 579-580 (Table 27.1)
21. Contrast saprobes (saprophytes) and parasites as types of heterotrophic bacteria. 581-587
22. Identify methanogens, nitrogen-fixing and sulfur-fixing bacteria as types of chemosynthetic autotrophs. 580, 584-585
23. Identify green and purple bacteria, and cyanobacteria as types of photosynthetic autotrophs. 582-583
24. Describe symbiotic bacterial relationships as mutualistic, commensal or parasitic. Describe Koch's Postulates. Define opportunistic bacteria, exotoxins, endotoxins and their implications in human disease. 586-587
25. Describe the major groups of eubacteria. 582-583
26. Discuss the varied significance of bacteria: ecological, use in research and technology. 587-588
27. Successfully complete assigned laboratory experiences.

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BIOL 102
Course #

General Biology II
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2 of 7 Units

4
Credits

Name of Unit: **The Kingdom Protista**

Unit Objective: The student will discuss and demonstrate understanding of classification, general characteristics and life cycles of organisms in the Kingdom Protista, citing representative examples.

Textbook: BIOLOGY by Urry et.al., - 11th edition - Chapter 28

Method of Evaluation: Unit Exam and Laboratory Practical

Estimated Time To Achieve: Two Weeks

Learning Objectives

Recommended Learning Experiences

The Student Will Be Able To:

Class Discussion
Textbook Readings:
Pages:

1. Briefly describe the endosymbiotic hypothesis of eukaryote evolution.

532-533, 593, 596-597
(Figures 25.10 & 28.3)

2. Discuss the state of flux concerning protistan taxonomy, including the tentative phylogeny.

592-596 (Fig. 28.2)

3. Describe and differentiate the following groups of protists:

I. Excavates

1. Diplomonads
2. Parabasalids
3. Kinetoplastids
4. Euglenids

597 (Fig. 28.2)
597 (Fig. 28.5)
598-599 (Fig. 28.7)
598 (Fig. 28.8)

II. SAR

A. Stramenopiles

1. Oomycetes
2. Diatoms
3. Golden algae
4. Brown algae

Figure 28.9
599-600 (Fig. 28.10)
600 (Fig. 28.11)
600-602 (Fig. 28.12 and 28.13)

B. Alveolates

1. Dinoflagellates
2. Apicomplexans
3. Ciliates

602 (Fig. 28.15)
602-603 (Fig. 28.16)
604-605 (Fig. 28.17)

C. Rhizarians

1. Forams
2. Radiolarians

605
605 (Fig. 28.18)

III. Archaeplastida

1. Red algae
2. Green algae

606-607 (Fig. 28.21)
607-608 (Figures 28.22 & 28.23)

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IV. Unikonta

1. Amoebas

608-611 (Fig. 28.21)

2. Slime molds (plasmodial and cellular)

609-611 (Figures 28.25 & 28.26)

4. Successfully complete assigned laboratory experiences.

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BIOL 102
Course #

General Biology II
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3 of 7 Units

4
Credits

Name of Unit: **The Kingdom Fungi**

Unit Objective: The student will discuss characteristics and life cycles of organisms in representative divisions of the Kingdom Fungi, citing examples.

Textbook: BIOLOGY by Urry et.al., - 11th edition – Chapter 31

Method of Evaluation: Unit Exam and Laboratory Practical

Estimated Time To Achieve: One Week

Behavioral Objectives	Recommended Learning Experiences
The Student Will Be Able To:	Class Discussion Textbook Readings: Pages:
1. Characterize the fungi as they relate to mode of nutrition, habitat and cell structure.	652-654 (Figures 31.2, 31.3& 31.4)
2. Describe modes of asexual reproduction involving spore or conidia formation.	655-657 (Fig. 31.5)
3. Describe gametangia and dikaryotic cell formation as part of the sexual reproduction process.	656 (Fig. 31.5)
4. Discuss the possible origin of fungi.	657-658
5. Describe the life cycle and unique characteristics of the Chytrids.	658-660
6. Describe the life cycle and name common examples of members of the Phylum Zygomycota.	660-661 (Figures 31.12 & 31.13)
7. Describe the unique characteristics of the glomeromycetes.	661 (Fig. 31.14)
8. Describe the life cycle and name common examples of members of the Phylum Ascomycota.	661-663 (Figures 31.15 & 31.16)
9. Describe the life cycle and name common examples of members of the Phylum Basidiomycota.	663-665 (Figures 31.17, 31.18 & 31.19)
10. Briefly describe the characteristics of members of the Phylum Deuteromycota (Imperfect fungi).	657
11. Explain the symbiotic relationships demonstrated by lichens and mycorrhizae.	654-655, 661 & 665-667 (Figures 31.14, 31.22 & 31.23)
12. Identify the significance of the fungi - ecologically, in the food industry, in medicine, and in research and technology.	668-669
13. Successfully complete assigned laboratory experiences.	Laboratory

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General Biology II
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4 of 7 Units

4
Credits

Name of Unit: **The Kingdom Plantae**

Unit Objective: The student will demonstrate an understanding of the evolution of higher plants, discuss general characteristics of all phyla of plants, some unique adaptations to their environment and their complex tissues.

Textbook: BIOLOGY by Urry et al., - 11th edition - Chapters 29, 30, 35 & 38

Method of Evaluation: Unit Exam and Laboratory Practical

Estimated Time To Achieve: Three Weeks

Learning Objectives

Recommended Learning Experiences

The Student Will Be Able To:

Learning Objectives	Recommended Learning Experiences
1. Describe the characteristics of members of the Kingdom Plantae; relate these traits to the algae, establishing a probable line of descent from the Chlorophytes.	Class Discussion Textbook Readings: Pages: 616-622
2. Identify the advantages and disadvantages of a terrestrial existence.	(Fig. 29.3)
3. Describe a generalized plant life cycle. Note the gametangia and their specialization into archegonia and antheridia.	618-619
4. Identify and give examples of the major phyla of vascular and nonvascular plants. Describe structures of each phylum that limit or allow invasion of the land.	620-622 (Table 29.1 & Fig. 29.6)
5. Describe the life cycle of a moss and a liverwort, noting their reliance on water.	622-626 (Figures 29.7 & 29.8)
6. Describe the life cycle of a fern, noting the reliance on water.	626-632 (Figures 29.12 & 29.14)
7. Describe the life cycles of gymnosperms and angiosperms, noting mechanisms to complete the life cycle without water.	634-645 (Figures 30.2, 30.3, 30.4, 30.7, 30.8, 30.10, 30.11 & 30.12)
8. Identify the major tissue types found in vascular plants.	760-763 (Figures 35.8 & 35.10)
9. Identify the tissue organization of roots, stems and leaves.	757-760
10. Compare and contrast monocots and dicots.	647-648 (Fig. 30.16)
11. Describe the structure and function of a typical flower to include development of pollen and the embryo sac.	642-645 and 821-827 (Figures 38.2 & 38.6)
12. Describe mechanisms of pollination and subsequent double fertilization.	636 and 822-826
13. Describe germination & development of the embryo, seed and fruit.	636, 643 and 824-830

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| 14. Explain the process of growth and development including the meristematic tissues, both root and stem, three primary meristems of roots and stems. | 764-768 |
| 15. Understand the growth, morphology and the development of tissues associated with woody plants | 770-772 |
| 16. Successfully complete assigned laboratory experiences. | Laboratory |

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Course #

General Biology II
Title

5 of 7 Units

4
Credits

Name of Unit: **The Kingdom Animalia**

Unit Objective: The student will demonstrate understanding of the origins and characteristics of members of the animal kingdom. Using representative phyla and classes, describe the cellular, tissue, organ and organ systems development.

Textbook: BIOLOGY by Urry et.al., - 11th edition - Chapters 32, 33 & 34

Method of Evaluation: Unit Exam and Laboratory Practical

Estimated Time To Achieve: Four Weeks

Learning Objectives

Recommended Learning Experiences

The Student Will Be Able To:

Class Discussion
Textbook Readings:
Pages:

- | | |
|--|------------------------|
| 1. List and describe the characteristics that distinguish animals from members of the other kingdoms. | 671-673 |
| 2. Review the characteristics of the major heterotrophic protistan phyla and their probable evolutionary relationships with the animals. | 673-677 |
| 3. Identify examples of the major animal phyla and classes. | Appendix E & Fig. 33.3 |
| 4. Describe the following features of complexity used to establish a hierarchy of animal groups: body symmetry, nervous system organization, type of gut, type of body cavity, segmentation, circulation and skeleton. | 677-682 (Fig. 32.8) |
| 5. Explain the importance of the triploblastic body plan. | 678-679 (Fig. 32.9) |
| 6. Discuss the protostome-deuterostome dichotomy to characterize the triploblastic animal groups. | 679-680 (Fig. 32.10) |
| 7. Distinguish the Parazoa from the Eumetazoa in terms of levels of organization. Discuss the importance of the development of specialized cells and tissues. | 688-689 |
| 8. Describe the body plan, cell types present, reproduction and skeletal elements of the phylum Porifera. | 688-689 |
| 9. Describe the tissue level of complexity, polymorphism, digestion, nervous system, reproduction (including life histories) of the phylum Cnidaria. Discuss the three major classes in this phylum. | 689-691 |
| 10. Describe the organ level of complexity, digestion, nervous system, reproduction (including life cycles that require an intermediate host) of the phylum Platyhelminthes. Characterize and list examples of the three classes in this phylum. | 692-695 |

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11. Briefly describe the characteristics of organisms of the phylum Nematoda. Discuss the importance of both soil and parasitic nematodes. 703-704
12. Describe the general molluscan body plan including advancements in circulatory, respiratory, urinary, nervous and digestive systems. Explain the significance of the trochophore larva; characterize and list examples of the major molluscan classes in terms of modification of the body plan and habitat. 697-700
13. Describe the annelid advancements over the molluscan body plan with emphasis on segmentation, cephalization and closed circulation. Characterize and list examples of the three major classes. 701-703
14. Characterize the phylum Arthropoda in terms of musculo-skeletal, segmentation, nervous, cardiovascular, respiratory, digestive and reproductive specializations. Describe and give examples of the subphyla. Identify the major classes including sample organisms and habitats, and discuss the diversity and success of this phylum. 704-711
15. Describe the specialized penta-radial adult echinoderm body plan resulting from metamorphosis of the bilateral larva. Describe the ambulacral braces as an endoskeleton. Characterize and list examples of the five major classes. 711-713
16. Describe the notochord, dorsal, hollow nervecord, pharyngeal gill slits and muscular postanal tail as the primary characteristics of phylum Chordata. 713, 716-718
17. Describe the three subphyla of the phylum Chordata. 718-720
18. Characterize and list examples of the seven major classes of subphylum Vertebrata of the phylum Chordata. 721-7743
19. Describe evolutionary trends in mammals, the development of the primates and the emergence of humankind. 741-752
20. Successfully complete assigned laboratory experiences. Laboratory

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Course #

General Biology II
Title

6 of 7 Units

4
Credits

Name of Unit:

Ecology

Unit Objective:

The student will demonstrate understanding of the inter-relationships of organisms, environment and energy at the population, community and biosphere levels. The student will be able to relate and understand aspects of energy, environment and population interactions to various biomes within the biosphere.

Textbook:

BIOLOGY by Urry et.al., - 11th edition - Chapters 52-56

Method of Evaluation:

Unit Exam and Laboratory Practical

Estimated Time To Achieve:

One Week

Learning Objectives

Recommended Learning Experiences

The Student Will Be Able To:

Class Discussion
Textbook Readings:
Pages:

- | | |
|---|-------------------------|
| 1. Understand and differentiate between the following: abiotic and biotic components, biological population, communities, population density and patterns of dispersion of species. | 1182-1185 and 1189-1197 |
| 2. Define exponential and logistic (sigmoidal) patterns of population growth. | 1194-1197 |
| 3. Define carrying capacity (K) of a population. | 1195-1196 |
| 4. Compare and contrast the characteristics of K-strategists with r-strategists. | 1198-1200 |
| 5. Describe the 3 major types of survivorship curves. | 1191-1192 |
| 6. Define a biological community. | 1212-1213 |
| 7. Discuss competition and predation as the two major interactions occurring between species within a community. | 1213-1216 |
| 8. Describe ecosystems in terms of biotic components, abiotic components and energy flow. | 1237-1246 |
| 9. Demonstrate the biotic components of an ecosystem by constructing sample food chains showing producers, consumers and decomposers. | 1231-1233 and 1238-1239 |
| 10. Demonstrate energy flow in an ecosystem by describing solar radiation and discuss the efficiency of energy transfer between trophic levels. | 1239-1244 |
| 11. Define primary and secondary succession. | 1226-1229 |
| 12. Describe interference with ecosystems by humans including the greenhouse effect, concentration of toxins through trophic levels, depletion of the ozone and introduction of exotic species. | 1259-1264 |

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| 13. Describe, in general, the biotic and abiotic factors of biomes. | 1164-1168 |
| 14. Identify and characterize the major aquatic ecosystems. | 1175-1180 |
| 15. Identify and characterize the major terrestrial biomes. | 1168-1174 |
| 16. Successfully complete assigned laboratory experiences. | Laboratory |

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General Biology II
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7 of 7 Units

4
Credits

Name of Unit:

Evolution

Unit Objective:

The student will demonstrate understanding of the probable steps in the origin of life on earth and the processes that have transformed life into the vast diversity present today.

Textbook:

BIOLOGY by Urry et.al., - 11th edition - Chapters 22, 23, 24, 25 & 26

Method of Evaluation:

Unit Exam and Laboratory Practical

Estimated Time To Achieve:

One Week

Learning Objectives

Recommended Learning Experiences

The Student Will Be Able To:

Class Discussion
Textbook Readings:
Pages:

- | | |
|---|----------------------------------|
| 1. Define evolution and explain parallel, convergent evolution and adaptive radiation in terms of the connection to taxa and evolutionary history in both monophyletic and polyphyletic taxa. | 540-542 and 552-559 |
| 2. Explain the facts and inferences that comprise Darwin's Theory of Natural Selection. | 469-474 |
| 3. Describe, as evidence of evolution, the studies of: Biogeography, Paleontology, Taxonomy, Comparative Anatomy, Comparative Embryology and Molecular Biology. | 477-482 and 526-531 |
| 4. Define Hardy-Weinberg Equilibrium as maintaining gene frequencies in a population. | 487-491 |
| 5. Describe the biological species concept. | 505-508 |
| 6. Describe prezygotic and postzygotic species reproductive isolating mechanisms. | 505-508 |
| 7. Describe Oparin and Haldane's concept of abiogenesis (origin of life on earth) citing experiments by Miller and Urey as support. | 524-526 |
| 8. Characterize the major eras and periods of the geologic timescale and discuss the effects of continental drift on phylogeny. | 530-538 (Fig. 25.8 & Table 25.1) |
| 9. Successfully complete assigned laboratory experiences. | Laboratory |

The syllabus is intended to give student guidance in what may be covered during the semester and will be followed as closely as possible. However, the faculty member reserves the right to modify, supplement, and make changes as the need arises.