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Alabama  
Department of  
Postsecondary Education

***Representing Alabama's Public Two-Year College System***

**Jefferson State Community College**

**BIO**  
**Prefix**

**102**  
**Number**

**Introduction to Biology II**  
**Course Title**

**BIO 101**  
**Prerequisite**

**Credit Hours: 4**

**Contact Hours: Lecture 3 Lab 2**

**I. COURSE DESCRIPTION**

This course is a continuation of the biological sequence for non-science majors. Biology 101 is a prerequisite for this course. Biology 102 covers concepts that pertain to the evolution of life on earth, the similarities and diversity that living organisms exhibit, the structure and function of plants, and ecology.

**II. GENERAL COURSE COMPETENCIES**

Upon completion of this course, the student will demonstrate that he has acquired the general course competencies as indicated in the following manners.

- A. Understand concepts related to evolution and the proposed origins of life.
- B. Understand what a species is and what mechanisms may be responsible for speciation.
- C. Understand macroevolution and what major events occurred throughout the geological time scale.
- D. Understand the hypothesis that relate to the first monomers and polymers on earth.
- E. Understand the major characteristic of the two domains of prokaryotes archea and bacteria.
- F. Know the specific functional and structural characteristics of prokaryotic organism.
- G. Know the major structural characteristics of the flagellates, apicomplexans, sarcodina, ciliates, slime molds, and algae and be able to give examples of each.
- H. Understand the different groups of protist and the specific similarities differences between each group.
- I. Understand the major differences between invertebrate and vertebrae.
- J. Know the various phyla of animals, specific characteristics of each, and examples of each. The characteristics include, body symmetry, digestive tract, coelom, and specific cell types.

- K. Understand the evolutionary lineage from the earliest primates to the present.
- L. Understand the evolution of plant life, structure and function, and metabolic processes.
- M. List and describe the different types of plant cells: parenchyma, collenchyma, sclerenchyma, and water and food conducting cells.
- N. List and describe the two major groups of angiosperms, dicots and monocots and contrast the major differences in structure and germination.
- O. Understand the different ways in which plants grow in length and girth.
- P. Understand how plants uptake nutrients from soil.
- Q. Be able to list the five major plant hormones and discuss where they are produced, mode of function, and antagonistic relationships between different classes.
- R. Distinguish between the different types of tropism, phototropism, gravitotropism, and thigmotropism. Understand how plants distinguish a photoperiod.
- S. Differentiate between the different mechanisms that plants use in order to defend against herbivores and infectious microbes.
- T. Understand the basic interrelationships that exist among Earth's diverse life forms.
- U. Understand the basic processes by which nutrients cycle between the biotic and abiotic.
- V. Describe the relationship that exists between biome types.
- W. Understand the implications of overpopulation for any species.
- X. Given an array of organisms, draw a food chain, identifying the mode of nutrition of organisms at each trophic level. Identify levels of the greatest biomass and energy.
- Y. Describe the flow of nutrients through an ecosystem, using carbon or nitrogen as an example.
- Z. Summarize the concept of ecological succession.

### III. COURSE OBJECTIVES

The student will be required to demonstrate that he has attained each general course competency by performing the objectives listed under each competency.

- A. Understand concepts related to evolution and the proposed theories of the origins of life.
  1. Discuss Charles Darwin's voyage to Galapagos Islands and his impact on evolution.
  2. Discuss other philosophers and scientist contributions to the earliest theories of evolution.
  3. Discuss the five major lines of evidence that support that evolutionary change occurred. (Fossils, comparative anatomy and embryology, biogeography, molecular biology).
  4. Know how to work a problem demonstrating the Hardy-Weinberg principle and the five conditions that must be met.
  5. List and describe the five potential cause of microevolution.
  6. Discuss case of microevolution
  7. Know the differences between the three major modes of natural selection that include directional, stabilizing, diversifying.
- B. Understand what a species is and what mechanisms are responsible for speciation.
  1. State and discuss the biological species and evolutionary species concepts that attempt to explain the differences between two species.
  2. Understand the different prezygotic and postzygotic reproductive barriers that keep species separate from one another.
  3. Understand the gradualistic and punctuated models that explain the possible patterns of evolution.

- C. Understand macroevolution and what major events occurred throughout the geological time scale.
  - 1. Know the major eras and periods of the geological time scale as well some important events that occurred in each
  - 2. Know what the continental drift hypothesis is, who proposed it, and environmental changes may have occurred as a result.
  - 3. Discuss the major mass extinctions, the periods in which they occurred, and the proposed cause and effects of each.
- D. Understand the hypothesis that relate to the first monomers and polymers on earth.
  - 1. Discuss earth's early atmosphere.
  - 2. Discuss in detail Stanley Millers experiment and what significant implications it had on the understanding of how monomers and life may have began on earth.
  - 3. Discuss the experiments of Sidney Fox, and other scientist and the contributions they made as it relates to the origin of the first polymers on earth.
  - 4. Discuss the hypothesis that the first genetic material was RNA.
  - 5. Understand the two hypotheses that propose how primitive cells first began cellular metabolism.
- E. Understand the major characteristic of the two domains of prokaryotes Archea and Bacteria.
- F. Know the specific functional and structural characteristics of prokaryotic organism.
  - 1. Know the difference between bacterial coccus, bacillus, spirillum, vibrios shapes.
  - 2. Be able to contrast the differences between prokaryotic and eukaryotic flagella.
  - 3. List some examples of diseases caused by different bacteria.
- G. Know the major structural characteristics of the flagellates, apicomplexans, sarcodina, ciliates, slime molds, and algae and be able to give examples of each.
- H. Understand the different groups of protist and the specific similarities differences between each group.
- I. Understand the major differences between invertebrate and vertebrae
- J. Know the various phyla of animals, specific characteristics of each, and examples of each. The characteristics include, body symmetry, digestive tract, coelom, and specific cell types.
- K. Understand the evolutionary lineage form the earliest primates to the present.
  - 1. Give examples and specific characteristic of the earliest groups of primates.
  - 2. Know the difference between old world and new world monkeys.
  - 3. Know the difference between homoniods and hominids and be able to trace human evolution overtime.
  - 4. Understand the major primate evolutionary trends, which include changes in eyesight, posture, teeth and skull structure, opposable thumbs, and brain size.
  - 5. Discuss the two major hypotheses that attempt to explain where *Homo sapiens* arose.
  - 6. Understand the impact culture has had on the evolution of *Homo sapiens*
- L. Understand the evolution of plant life, structure and function, and metabolic processes.
  - 1. Explain the proposed evolutionary history of plants and give an example of the first plants thought to have colonized land.
  - 2. Discuss the major adaptive characteristics that made land colonization successful for plants.
  - 3. Be able to list and describe the function of the major plant organs that include the root and shoot systems.
  - 4. Know the location and function of the three major types of plant tissue: ground, epidermis and vascular.
  - 5. Contrast the major differences and similarities between algae and plants.

6. With the aid of diagrams be able to describe the different life cycles ferns, mosses, conifers, and fungi.
- M. List and describe the different types of plant cells, parenchyma, collenchyma, sclerenchyma, and water and food conducting cells.
- N. List and describe the two major groups of angiosperms, dicots and monocots, and contrast the major differences in structure and germination.
- O. Understand the different ways in which plants grow in length and girth.
  1. Describe the two major processes involved in the primary and secondary growth.
- P. Understand how plants uptake nutrients from soil.
  1. Know the differences between macronutrients and micronutrients and give examples of each.
  2. Know what particular characteristics of plants indicate specific nutrient deficiency.
  3. Describe in detail along with diagram aid the two major models used to explain the transport of water and sugar.
- Q. Be able to list the five major plant hormones and discuss where they are produced, mode of function, and antagonistic relationships between different classes.
- R. Distinguish between the different types of tropism, phototropism gravitotropism, and thigmotropism. Understand how plants distinguish a photoperiod.
- S. Differentiate between the different mechanisms that plants use in order to defend against herbivores and infectious microbes.
- T. Understand the basic interrelationships that exist among Earth's diverse life forms.
- U. Understand the basic processes by which nutrients cycle between the biotic and abiotic.
- V. Understand the relationships that exist between biome types.
  1. Differentiate between the various kinds of biomes with comparison between temperature, location, and animal inhabitants.
- W. Understand the implications of overpopulation for any species.
  1. Recognize the role played by man in environmental change and consequences.
- X. Given an array of organisms, draw a food chain, identifying the mode of nutrition of organisms at each trophic level. Identify levels of the greatest biomass and energy.
- Y. Describe the flow of nutrients through an ecosystem, using carbon or nitrogen as an example.
- Z. Summarize the concept of ecological succession.

#### **IV. CLASS ACTIVITIES**

- A. Lecture.
- B. AV self-instruction.
- C. AV classroom instruction.
- D. Weekly laboratory exercises

#### **V. CRITERIA FOR EVALUATION**

The student will have demonstrated attainment of the general course competencies if he accumulates a total of 70 percent of the points possible from the following criteria:

- E. Scheduled lecture exercise and/or examination.
- F. Laboratory examinations.
- G. The student will pass course with 60% accuracy.

## **XI. ATTENDANCE**

Students are expected to attend all classes for which they are registered. Students who are unable to attend class regularly, regardless of the reason or circumstance, should withdraw from that class before poor attendance interferes with the student's ability to achieve the objectives required in the course. Withdrawal from class can affect eligibility for federal financial aid.

## **XII. STATEMENT ON DISCRIMINATION /HARASSMENT**

The College and the Alabama State Board of Education are committed to providing both employment and educational environments free of harassment or discrimination related to an individual's race, color, gender, religion, national origin, age, or disability. Such harassment is a violation of State Board of Education policy. Any practice or behavior that constitutes harassment or discrimination will not be tolerated.

## **XIII. AMERICANS WITH DISABILITIES**

The Rehabilitation Act of 1973 (Section 504) and the Americans with Disabilities Act of 1990 state that qualified students with disabilities who meet the essential functions and academic requirements are entitled to reasonable accommodations. It is the student's responsibility to provide appropriate disability documentation to the College. The ADA Accommodations office is located in FSC 300 (205-856-7731).

