

BIO 111

GENERAL BIOLOGY I

COURSE DESCRIPTION:

Prerequisites ENG 090, MAT 070, and RED 090, or satisfactory score on placement test

Corequisites: None

This course introduces the principles and concepts of biology. Emphasis is on basic biological chemistry, cell structure and function, metabolism and energy transformation, genetics, evolution, classification, and other related topics. Upon completion, students should be able to demonstrate understanding of life at the molecular and cellular levels. Laboratory exercises reinforce lecture topics and include microscope techniques. *This course has been approved to satisfy the Comprehensive Articulation Agreement for the general education core requirement in natural sciences/mathematics.* Course Hours Per Week: Class, 3. Lab, 3. Semester Hours Credit, 4.

LEARNING OUTCOMES:

After completion of this course, the student will demonstrate basic knowledge in each of the following:

- a. Characteristics of living organisms.
- b. Basic differentiating characteristics of the five kingdoms.
- c. Chemical composition of living matter.
- d. Structural characteristics of prokaryotic and eukaryotic cells.
- e. Mechanisms of membrane transport.
- f. Basic concepts of bioenergetics, photosynthesis, and cellular respiration.
- g. Mechanisms and function of cellular reproduction.
- h. Mendelian genetics and genetic change.
- i. Role of nucleic acids in the cell.
- j. Mechanisms of protein synthesis and regulation of gene expression.
- k. Basic concepts in biotechnology.
- l. Basic events in the origin of life.
- m. Basic concepts of variation, natural selection, and speciation.

OUTLINE OF INSTRUCTION:

- I. Introduction to living organisms
 - A. Characteristics of life
 - B. The five kingdoms
- II. Chemical composition of cells
 - A. Organization of matter
 - B. Bonding between atoms
 - C. Water and its properties
 - D. Acids, bases, and salts
 - E. Biological molecules

III. Cell structure and function

- A. Cell theory
- B. Comparison of prokaryotic and eukaryotic cells
- C. Comparison of autotrophs and heterotrophs
- D. Composition and function of cell structures
- E. Cell membranes and membranous organelles
- F. Comparison of plant and animal cells

IV. Cellular transport

- A. Structure of cell membrane
- B. Diffusion and osmosis
- C. Facilitated and active transport
- D. Pinocytosis and phagocytosis

V. Bioenergetics

- A. Metabolism
- B. Enzymes
- C. Energy and ATP
- D. Hydrogen and electron carriers

VI. Cellular respiration

- A. Fermentation and anaerobic respiration
- B. Aerobic respiration

VII. Photosynthesis

- A. Nature of light
- B. Pigments
- C. Chloroplast structure
- D. Light dependent reactions
- E. Light independent reactions

VIII. Cellular reproduction

- A. Prokaryotic cell reproduction
- B. Eukaryotic cell reproduction
- C. Stages of mitosis
- D. Stages of meiosis

IX. Genetics

- A. Mendelian genetics
- B. Incomplete dominance
- C. Sex linkage
- D. Mutations and genetic change

X. Protein synthesis

- A. Structure of DNA and its replication
- B. Structure of RNA and the genetic code
- C. Protein synthesis
- D. Chemical basis of mutation

XI. Origin of life and evolution

- A. Formation of earth
- B. Origin of heterotrophs and autotrophs
- C. Rise of eukaryotes
- D. Origin of multicellularity
- E. Natural selection
- F. Variation and speciation

XII. Biotechnology

- A. Basic techniques in biotechnology
- B. Formation of Genetically Modified Organisms (GMOs)
- C. Prospects for use of this technology.

REQUIRED TEXTBOOKS:

Texts to be selected by the instructor and made available through the bookstore.

Lab Packet (Laboratory Exercises). 8th ed. Durham Technical Community College, 2006.

SUGGESTED REFERENCES, PERIODICALS, AND VISUAL AIDS:

Numerous supplementary texts, programmed materials, and audiovisual packages are available in the Educational Resources Center. These materials may be utilized to reinforce the lecture and lab material or to provide material for independent study by the student.

STATEMENT FOR STUDENTS WITH DISABILITIES:

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 686-3652 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1309.