

**BIO 092**  
**BASICS OF CELL BIOLOGY**

**COURSE DESCRIPTION:**

Prerequisites: MAT 060 and RED 080, or satisfactory score on placement test

Corequisites: RED 090 or satisfactory score on placement test

This course covers basic cell biology. Emphasis is on biological chemistry, cell structure and function, cellular metabolism, genetics, and other related topics. Upon completion, students should be able to demonstrate preparedness for college-level biology courses. Laboratory exercises focus on basic biological principles and microscope techniques. Course Hours Per Week: Class, 3. Lab, 2. Semester Hours Credit, 4.

**LEARNING OUTCOMES:**

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

- a. Basic chemical composition of living matter.
- b. Structural characteristics of prokaryotic and eukaryotic cells.
- c. Taxonomy and characteristics of the major kingdoms.
- d. Mechanics of membrane transport.
- e. Basic concepts of bioenergetics, photosynthesis, and cellular respiration.
- f. Mechanics of cellular reproduction.
- g. Mendelian genetics and genetic change.
- h. Nucleic acids and basic concepts of protein synthesis and gene regulation.

**OUTLINE OF INSTRUCTION:**

- I. Introduction to biological chemistry
  - A. Organization of matter
  - B. Atomic theory
  - C. Bonding between atoms
  - D. Water and its properties
  - E. Acids, bases, and salts
  - F. Carbon compounds
  - G. Biochemical Compounds
- II. Cell structure and function
  - A. Cell theory
  - B. Composition and function of cell structures
  - C. Cell membranes and membranous organelles

- D. Comparison of prokaryotic and eukaryotic cells
- E. Comparison of plant and animal cells

### III. Classification

- A. Comparison of autotrophs and heterotrophs
- B. Comparison of aerobes and anaerobes
- C. Classification schemes
- D. Kingdoms, their characteristics, and examples

### IV. Cellular transport

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

### V. Bioenergetics

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

### VI. Cellular respiration

- A. Aerobic respiration
- B. Anaerobic respiration
- C. Fermentation
- D. Mitochondrial structure

### VII. Photosynthesis

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

### VIII. Cellular reproduction

- A. Binary fission
- B. Chromosome structure
- C. Cell Cycle
- D. Stages of mitosis
- E. Stages of meiosis

### IX. Protein synthesis

- A. Structure of DNA and its replication
- B. Structure of RNA

- C. Protein synthesis
- D. Chemical basis of mutation

X. Genetics

- A. Gene and chromosome structure
- B. Mendelian genetics
- C. Incomplete dominance
- D. Multiple alleles and multiple gene pairs
- E. Sex linkage and autosomal linkage
- F. Mutations and genetic change
- G. Inherited Disorders

XI. Human Biology

- A. Medical Terminology
- B. Primary Tissues
- C. Basic anatomy of the major human body systems

**REQUIRED TEXTBOOKS AND MATERIALS:**

Campbell, N. A., Reece, J. B., and E. J. Simon. Essential Biology with Physiology. 1<sup>st</sup> ed. San Francisco: Benjamin Cummings, 2004.

Lab packet (Laboratory Exercises). Durham Technical Community College, 2005.

**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.