

Course discipline/number/title: SCIE 1100: Integrated Biology and Chemistry

A. CATALOG DESCRIPTION

1. Credits: 3
2. Hours/Week: 2 lecture, 2 lab
3. Prerequisites (Course discipline/number): None
4. Other requirements: None
5. MnTC Goals (if any): Goal 3/Natural Sciences

B. COURSE DESCRIPTION: This one semester course is designed to introduce students to key concepts in biology and chemistry using an integrated approach. The course covers basic biological and chemical terminology while emphasizing the connection between biology and chemistry in major content areas, including scientific methodology, characteristics of life, chemical structure of biological molecules, cell structure and function, chemical reactions and metabolism, genetics, and biotechnology.

C. DATE LAST REVISED (Month, year): November, 2022

D. OUTLINE OF MAJOR CONTENT AREAS:

1. Introduction to Science
  - a) Nature of Science
  - b) Scientific Method and Models
  - c) Scientific Communication
2. Characteristics and Chemistry of Life
  - a) Atomic Structure
  - b) Biological Molecules
    - i. Chemical Bonding
    - ii. Molecular Shape
    - iii. Intermolecular Forces
    - iv. Organic Functional Groups
  - c) Properties of Water
    - i. Polarity
    - ii. Electrolytes
3. Cell Structure and Function
  - a) Classification and Cell Types
  - b) Organelles
  - c) Cell Membranes
    - i. Intermolecular Forces
    - ii. Hydrophobic and Hydrophilic Interactions
    - iii. Transport
4. Metabolism
  - a) Photosynthesis
  - b) Cellular Respiration
  - c) Chemical Reactions
    - i. Balanced Chemical Equations
    - ii. Oxidation Reduction Reactions
  - d) Kinetics
    - i. Enzymes
    - ii. Thermodynamics
5. Mendelian and Molecular Genetics
  - a) Patterns of Inheritance
  - b) Cellular Division
    - i. Cell Cycle
    - ii. DNA Structure & Replication
    - iii. Hydrogen Bonding
    - iv. Mutations
  - c) Protein Synthesis

- D. OUTLINE OF MAJOR CONTENT AREAS: Continued. . .
- i. Transcription
  - ii. Translation
  - d) Biotechnology
    - i. Polymerase Chain Reaction
    - ii. Genetic Engineering
- E. LEARNING OUTCOMES (GENERAL): The student will be able to:
- 1. Use appropriate terminology to explain fundamental concepts of biology and chemistry.
  - 2. Demonstrate the ability to make connections within and across biology and chemistry.
  - 3. Design and conduct scientific investigations, evaluate results and draw logical conclusions.
- F. LEARNING OUTCOMES (MNTC):
- Goal 3/Natural Sciences: The student will be able to:
- 1. Demonstrate understanding of scientific theories.
  - 2. Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students' laboratory experience in the collection of data, its statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.
  - 3. Communicate their experimental findings, analyses, and interpretations both orally and in writing.
- G. METHODS FOR EVALUATION OF STUDENT LEARNING: Methods may include but are not limited to:
- 1. Lab reports and/or quizzes
  - 2. Lecture quizzes
  - 3. Group work/projects
  - 4. Presentations
  - 5. Exams
- H. RCTC CORE OUTCOME(S). This course contributes to meeting the following RCTC Core Outcome(s): Critical Thinking. Students will think systematically and explore information thoroughly before accepting or formulating a position or conclusion.
- I. SPECIAL INFORMATION (if any): None