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

A. CATALOG DESCRIPTION
1. Credits: 3
2. Hours/Week: 2 hours lecture, 2 hours lab
3. Prerequisites (Course discipline/number): 12th grade reading and writing skills
4. Co-requisites (Course discipline/number): None
5. MnTC Goals (if any): Goal 2/Critical Thinking, Goal 3/Natural Sciences

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 which include: the characteristics of life, the chemical structure of biological molecules, cell structure and function, chemical reactions and metabolism, genetics and biotechnology.

B. DATE LAST REVISED (Month, year): January, 2011

C. OUTLINE OF MAJOR CONTENT AREAS:
1. Introduction to Science
   a) Nature of Science
   b) Historical Perspective
   c) Scientific Method
2. Characteristics & Chemistry of Life
   a) Atomic Structure
   b) Biological Molecules
      i. Chemical Bonding
      ii. Molecular Shape
      iii. Organic Functional Groups
   c) Properties of Water
      i. Polarity
   d) Electrolytes
3. Cell Structure & Function
   a) Organelles
   b) Cell Membrane
      i. Intermolecular Forces
      ii. Hydrophobic and Hydrophilic Interactions
   c) Transport Across Membranes and Equilibrium
4. Metabolism
   a) Photosynthesis
   b) Cellular Respiration
      i. Aerobic Respiration
      ii. Anaerobic Fermentation
   d) Chemical Reactions
      i. Balanced Chemical Equations
      ii. Oxidation Reduction Reactions
   e) Kinetics
      i. Enzymes
      ii. Thermodynamics
5. Mendelian & Molecular Genetics
   a) Patterns of Inheritance
   b) Cellular Division
      i. Cell Cycle
      ii. DNA Structure & Replication
      iii. Hydrogen Bonding
D. OUTLINE OF MAJOR CONTENT AREAS: Continued...
   c) Protein Synthesis
      i. Transcription
      ii. Translation
      iii. Mutations
d) Biotechnology
   i. Polymerase Chain Reaction
   ii. Genetic Engineering
6. Classification of Organisms

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.
4. Use scientific understandings and abilities when making decisions about personal and societal issues.

F. LEARNING OUTCOMES (MNTC):
Goal 2/Critical Thinking: The student should be able to:
1. Gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive, and conscious of possible bias in the information selected.
2. Imagine and seek out a variety of possible goals, assumptions, interpretations, or perspectives which can give alternative meanings or solutions to given situations or problems.
3. Analyze the logical connections among the facts, goals, and implicit assumptions relevant to a problem or claim; generate and evaluate implications that follow from them.
4. Recognize and articulate the value assumptions which underlie and affect decisions, interpretations, analyses, and evaluations made by ourselves and others.

Goal 3/Natural Sciences: The student should 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.
4. Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.

G. METHODS FOR EVALUATION OF STUDENT LEARNING:
Methods may include any of the following:
1. Lab reports and/or quizzes
2. Lecture quizzes
3. Group work/projects
4. Presentations
5. Exams

H. RCTC CORE OUTCOME(S) ADDRESSED:
- Communication
- Critical Thinking
- Global Awareness/Diversity
- Civic Responsibility
- Personal/Professional Accountability
- Aesthetic Response

I. SPECIAL INFORMATION (if any): None