

ROCHESTER COMMUNITY & TECHNICAL COLLEGE

COMMON COURSE OUTLINE: Course discipline/number Biology 1220

A. CATALOG DESCRIPTION (include prerequisites)

Course Title: Concepts of Biology
Credits: 4
Hours/Week: 3 hours lecture and 2 hours lab per week
Semesters Offered: Fall, Spring
Prerequisites: High school chemistry or CHEM 1101 or equivalent,
and high school biology or BIOL 1101 or equivalent

This course meets the requirements for the Minnesota Transfer Curriculum in CT (Critical Thinking), NS (Natural Science) and PN (People and the Environment).

A study of the biochemical and structural basis of life including cellular respiration, photosynthesis, genetics, origins and evolution of life, community interactions and ecosystems. Intended for biology majors and individuals majoring in forestry, agriculture, conservation, medicine, veterinary medicine, recreation, physical therapy, optometry, pharmacy, home economics and dentistry.

B. DATE LAST REVISED (use current date): April 1997

C. RECOMMENDED ENTRY SKILLS/KNOWLEDGE:

College-level reading and writing and working knowledge of elementary algebra

D. OUTLINE OF MAJOR CONTENT AREAS:

1. The Cellular Basis of Life
 - a. Chemical foundations for cells
 - b. Carbon compounds in cells
 - c. Cell structure and function
 - d. A closer look at cell membranes
 - e. Ground rules of metabolism
 - f. Energy-acquiring pathways
 - g. Energy-releasing pathways

2. Principles of Inheritance
 - a. Cell division and mitosis
 - b. Meiosis
 - c. Observable patterns of inheritance
 - d. Chromosomes and human genetics
 - e. DNA structure and function
 - f. From DNA to proteins
 - g. Control of gene expression
 - h. Recombinant DNA and genetic engineering

D. OUTLINE OF MAJOR CONTENT AREAS (continued):

3. Principles of Evolution
 - a. Emergence of evolutionary thought
 - b. Microevolution
 - c. Speciation
 - d. The macroevolutionary puzzle

4. Ecology and Behavior
 - a. Population ecology
 - b. Community interactions
 - c. Ecosystems
 - d. The biosphere
 - e. Human impact on the biosphere
 - f. An evolutionary view of behavior
 - g. Adaptive value of social behavior

Laboratory activities are used to enhance, correlate and demonstrate a variety of scientific inquiry and as verifications of concepts covered in lectures.

Lab #1	Measurement and graphing
Lab #2	Microscopy
Lab #3	Structure and function of living cells
Lab #4	Diffusion, osmosis and the functional significance of biological membranes
Lab #5	Enzymes: catalysts of life
Lab #6	Photosynthesis: capture of light energy
Lab #7	Respiration: energy conversion; plants
Lab #8	Respiration, energy conversion - animals
Lab #9	Mitosis and cytokinesis: nuclear and cytoplasmic division
Lab #10	Meiosis: basis of sexual reproduction
Lab #11	Mendelian genetics
Lab #12	Applied genetics
Lab #13	Nucleic acids: blueprints for life
Lab #14	Recombinant DNA
Lab #15	Evolutionary agents
Lab #16	Ecology: living organisms in their environment

E. LEARNING OUTCOMES (GENERAL):

1. Learn the biological terminology
2. Learn the principles of photosynthesis and cellular respiration
3. Learn the principles of inheritance in plants and animals
DNA structure and function; DNA to proteins; gene control
4. Learn the principles of micro and macroevolution
5. Learn the dynamics of plant and animal ecology and behavior

F. LEARNING OUTCOMES (MNTC):

Critical Thinking

- a. 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.
- b. 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.
- c. 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.
- d. Recognize and articulate the value assumptions which underlie and affect decisions, interpretations, analyses and evaluations made by ourselves and others.

Natural Sciences

- a. Demonstrate understanding of scientific theories in the biological sciences.
- b. Formulate and test hypothesis by performing laboratory and field experiments requiring collection of data, its statistical and/or graphical analysis, and an appreciation of uncertainty and sources of error
- c. Communicate their experimental findings, analysis and interpretations both orally and in writing.
- d. Evaluate society issues from a natural science perspective, ask questions about the evidence presented and make informed judgments about science-related topics and policies.

People and the Environment

- a. Explain the basic structure and function of various natural ecosystems and of human adaptive strategies within those systems.
- b. Describe the basic institutional arrangements (social, legal, political, economic, religious) that are evolving to deal with environmental and natural resource challenges.
- c. Evaluate critically environmental and natural resource issues in light of understandings about interrelationships, ecosystems and institutions.
- d. Propose and assess alternative solutions to environmental problems.
- e. Articulate and defend the actions they would take on various environmental issues.

G. METHODS FOR EVALUATION OF STUDENT LEARNING:

1. Examinations over topics discussed in lecture.
2. Laboratory reports which are turned in at the end of each lab.
3. Midterm and final lab practicals over lab exercises.

H. SPECIAL INFORMATION (fees, directives on hazardous materials, etc.):

The initial lab session explains and familiarizes the student with general safety hazards and safety equipment in the lab. During the pre-lab discussion, the hazardous characteristics of any materials used during the lab are discussed. In addition, if the lab involves any potentially infectious material, the students will be instructed on the proper use and disposal. The instructor will direct all students to wear necessary protective equipment while working with any hazardous chemicals. A copy of Material Safety Data Sheets for chemicals used is available in the lab.