BIOLOGY 0110 COURSE OUTLINE

FALL 2000

INSTRUCTOR:	Audrey Wells
OFFICE:	J115
OFFICE PHONE:	539-2038
OFFICE HOURS:	drop in or make an appointment
TEXTBOOK:	Modern Biology by Albert Towle, Holt, Rinehart, and Winston.
SUPPLIES:	lined and unlined paper, three ring binder, stapler; lab coat is recommended but not mandatory.
COURSE GOALS:	This course is designed to introduce the student to some basic biological concepts and principles. The lab component will give students an opportunity to obtain hands-on experience , and to develop skills relating to observation, collection and analysis of data.
ATTENDANCE:	Regular attendance is crucial for passing the course. Students who miss class will soon find themselves falling behind and failing. Lateness will not be tolerated as it interrupts the instructor and fellow students.
TESTS / EXAMS:	There will be several tests throughout the term. There will also be a midterm and a final exam. Absence from a test or exam **will result in a mark of zero**. You will **not** be permitted to have a makeup test unless you have called and either talked to me or left a message on my answering machine BEFORE the test. Absence from the midterm requires a doctor's certificate.
LABS:	Attendance is compulsory for all labs. Evaluation of the labs is either through a lab quiz and/or a lab report. Due dates for labs will be announced during the lab period. Late labs will be docked 10% per day. Once corrected lab reports have been returned, late labs will not be accepted.
EVALUATION:	Labs.....20% Tests.....30% Midterm exam....20% Final exam.....30%

Biology 0110

General Course Objectives

Unit 1: Introduction to Microscopy

1. State the contribution of Anton van Leeuwenhoek to microscopy.
2. Define magnification and resolution.
3. Differentiate between the compound light microscope and the electron microscope.
4. Discuss the two main types of electron microscopes and identify pictures taken with each.
5. Identify the structure and function of each of the following microscope parts, and indicate them on a diagram of the microscope: eyepieces, eye width adjustment, diopter adjustment, binocular viewing tube, revolving nose piece, objectives, arm, stage, mechanical stage, condenser, diaphragm, coarse adjustment, fine adjustment, lamp.
6. List the safety procedures one must follow to correctly use the microscope.

Lab: Care and Use of the Compound Microscope

Unit 2: The Cell is the Basic Unit of Living Systems

1. Trace the development of the cell theory: (e.g., from Aristotle to Hooke, Pasteur, Brown, Schleiden, and Schwann).
2. State and critic the cell theory.
3. Describe the structure of the cell membrane, nucleus, nucleoid, endoplasmic reticulum, Golgi apparatus, lysosome, vacuole, mitochondrion, chloroplast, ribosome, cytoskeleton, and cell wall, where present, in bacteria, plant, and animal cells.
4. Identify the functions of the cell membrane and the above organelles.

5. Compare the structure, chemical composition and function of plant and animal cells, and describe the complementary nature of the structure and function of plant and animal cells.

6. Describe similarities and differences in the structure and function of prokaryotic and eukaryotic cells.

7. Describe how advancements in knowledge of cell structure and function have been enhanced and are increasing as a direct result of developments in microscope technology and staining techniques. (e.g., electron micrsocope, confocal lasar scanning microscope [CLSM]).

Lab: Cell Structure

Unit 3: Growth and Living Systems

1. Describe what is meant by growth in terms of both an increase in the number of cells (by fission or mitosis), and the increase in size or weight of a cell or organism.

2. Determine how the surface to volume ratio of a cell might limit its growth and predict how multicellularity enhances the ability to use nutrients.

3. Compare cell size and shape as they relate to the concept of surface area to volume ratio and how that ratio limits cell size (e.g., compare nerve cells and blood cells in animals; plant root hair cells, and chloroplast - containing cells on the leaf surface).

4. Outline the levels of organization of a multicellular organism.

5. Define division of labor and explain how division of labor occurs within a single cell and, after the process of differentiation, in a multicellular organism.

Unit 4: The Cell as an Open System

1. Differentiate between open and closed systems.

2. Define diffusion and describe how materials diffuse across a cell membrane in terms of concentration gradients.

3. Define osmosis, and differentiate between hypotonic, hypertonic, and isotonic solutions.

4. Predict the outcomes of placing animal and plant cells in solutions of varying concentrations.

5. Discuss other methods of membrane transport such as active transport.

6. Describe how knowledge about semi-permeable membranes, diffusion and osmosis has been applied in technology.

Lab: Osmosis and Diffusion

Unit 5: Energy from the Sun Sustains Life on Earth

1. Describe, in general terms, how the energy in light is stored in plant chloroplasts and then transferred for storage in ATP molecules.

2. Describe, in general terms, how carbon dioxide molecules in solution, or in the air, are fixed as carbohydrates in the plant chloroplasts, using the stored light energy.

3. Define photosynthesis as the process by which green plants put together carbon dioxide and water to store energy and form carbohydrates and oxygen.

4. Define aerobic respiration as the process by which organisms release energy by reacting on carbohydrates and oxygen to form carbon dioxide and water.

5. Discuss the oxygen cycle.

Lab: Photosynthesis

Unit 6: Plants as an Example of a Multicellular Organism

1. Infer how organism size necessitates the move to a multicellular level of organization and is related to the specialization of plant cells, tissues, and systems.

2. Describe how the cells of the leaf system have a variety of specialized structures and functions; ie epidermis including guard cells, palisade tissue cells, spongy tissue cells, and phloem and xylem vascular tissue cells.

3. Explain and investigate the transport system in plants; i.e. xylem and phloem tissues and the process of transpiration; including cohesion and adhesion properties of water, turgor pressure and osmosis; diffusion, active transport, and root pressure in root hairs.

4. Explain and investigate the gas exchange system in plants; ie. lenticels, guard cells and stomata, and the process of diffusion

5. Explain and investigate phototropism and geotropism as examples of control systems in plants.

6. Trace the development of theories of phototropism and geotropism (e.g. from Darwin and Boysen-Jensen to Went)

LAB: Water Movement in Plants

Unit 7: Plants as Components of the Larger Community

1. List and describe the three major components of the Earth's biosphere - the atmosphere, the hydrosphere, and the lithosphere.

2. Define biome, and relate and analyze the characteristics of climatograms of the major biomes; ie., grasslands, desert, tundra, taiga, deciduous and rain forest, to net radiant energy and climatic factors; i.e., temperature, moisture, sunlight, and wind, and explain why biomes with similar characteristics can exist in different geographical locations, latitudes, and altitudes.

3. Explain why a biome is an open system in terms of its components, such as input and output of energy and matter and changes in its boundaries.

4. Compare and contrast cells and biomes as open systems.