

SOUTHEAST MISSOURI STATE UNIVERSITY

Department: Biology

Course Number: BI 190

Title of Course: Life Processes

New Fall 2000

I. Catalog Description and Credit Hours of Course:

Fundamental biological processes, emphasizing bioenergetics, cell function, and heredity, with their applications to ecosystems. 4 lectures, 1 recitation. 4 credit hours.

II. Prerequisite or Corequisite: CH-185 OR one year of High School Chemistry with grade of B or better and co-enrollment in CH 185.

III. Purposes or Objectives of the Course: **Student objectives:**

- A. Develop an appreciation for some of the major disciplines within the field of biology and their relationships.
- B. Understand and describe population growth and interactions among populations.
- C. Understand and describe trophic structure of communities and nutrient cycling.
- D. Explain the flow of energy in living systems.
- E. Explain fundamental mechanisms of energy transduction in cells.
- F. Explain the structure and role of biological membranes as dynamic partitions and organizing surfaces.
- G. Explain the relationships among amino acid sequence, structure, and function in proteins.
- H. Understand and describe the fundamentals of eukaryotic cell organization.
- I. Apply concepts of Mendelian genetics to predict the results of crosses.
- J. Describe and diagram mechanisms of cell division and how these processes relate to life history aspects.
- K. Explain the relationship between genotype and phenotype.
- L. Explain a mechanism of gene regulation and predict results of mutations of genes involved in the mechanism.

IV. Expectations of Students:

A detailed study guide is used in the course. Lecture/discussion periods will include a mix of lecture material, individual and group exercises. All students are expected to prepare for and participate during each period. In each recitation session, students will have to prepare for class by reading assigned material from the study guide, the textbook, or supplemental readings, then complete a written assignment. These preparatory written assignments will be collected and graded. The students will then participate in group discussions and other activities based on the preparatory material, and in many exercises the group will turn in written work. Students will also take four midterm examinations and a final exam.

V. Course Content or Outline:

Lec	Rec	Topic	Lecture	Recitation
4	1	Ecosystems	Introduction and overview Food webs Energy pyramids Trophic levels Community interactions	Community interactions
4	1	Ecology	Biomes and abiotic factors Populations Carrying capacity Nutrient cycling Natural selection Adaptation	Population dynamics
3	1	Metabolism	Predation and food Reactions Biomolecules	Macromolecules 4-classes/food labels
4	1	Cells	Metabolism basics Cell organization Cell variation Cell size Membranes, phospholipids EXAM 1	Metabolism as reaction series
4	1	Membranes	Fluid mosaic model Membranes as partitions Transport mechanisms	Membrane structure/lipid fluidity

4	1	Bioenergetics	ATP/energetics Respiration Glucose, an energetic molecule Extracting energy from glucose	Osmosis/diffusion/energetics lab
4	1	Bioenergetics	Photosynthesis Light energy capture Carbon reduction recap of bioenergetics EXAM 2	Pencil and paper problems
2	1	Proteins	Protein structure	Protein shape
4	1	Enzymes	Reaction rates enzyme function Enz examples: Carboxypeptidase Enz examples: Permeases	
4	1	Protein synthesis	Central dogma Promoters Coding problem Translation EXAM 3	Arbitrary nature of the code
4	1	Membrane targeting chromosomes	Structure and c-value paradox exam	Mitosis - % of cells in each stage
4	1	Replication meiosis	Replication and mitosis Sexual fusion Meiosis Life cycles	Meiosis - % of cells in each stage
4	1	Mendelian genetics	Mendel Complete dominance Incomplete dominance Codominance Sex linkage	Blending vs. particulate
2		Dihybrids	Dihybrids Epistasis EXAM 4	Corn chi square
4	1	Linkage	Linkage	Linkage with clay or pop-beads
4	1	Operons	Operons	Fly lab project?

VI. Textbook:

Campbell, Biology. 5th Edition. Benjamin/Cummings: Redwood City, CA; 1998.

VII. Basis for Student Evaluation:

Exams	75%
Worksheets/Assignments	25%