

SOUTHEAST MISSOURI STATE UNIVERSITY

Department of Biology

BI 154

Genetics and Cell Biology

New Spring 2004

I. Catalog Description and Credit Hours:

Biological molecules and their interactions, DNA replication, gene expression and regulation, membrane structure and function, cellular organization and cellular energetics. Three hours lecture, 2 hours lab. (4)

II. Pre-requisites:

BI 153. Pre- or co-requisite: CH185

III. Purposes or Objectives of Course:

Students will be able to:

- A. Explain fundamental mechanisms of energy transduction in cells.
- B. Explain the structure and role of biological membranes as dynamic partitions and organizing surfaces.
- C. Explain the relationships among amino acid sequence, structure, and function in proteins.
- D. Understand and describe the fundamentals of eukaryotic cell organization.
- E. Apply concepts of Mendelian genetics to predict the results of crosses.
- F. Describe and diagram mechanisms of cell division.
- G. Explain the relationship between genotype and phenotype.
- H. Explain a mechanism of gene regulation and predict results of mutations of genes involved in the mechanism.
- I. Continue to develop the concept of conjecture/refutation via active experimentation.

IV. Expectations of Students:

- A. Attend all lectures, participate in discussions, and complete assignments.
- B. Participate in laboratory activities and prepare appropriate reports.
- C. Take three hour examinations and a final exam.

V. Course Content and Outline:

Lecture Topic	Lab Topic*	Class Periods	
		Lecture	Lab
Atoms and molecules, bonding		2	
	Food labels case study		1
Organic molecules		3	
	Molecules in 3 dimensions		1
Proteins; enzymes		4	
	Enzyme function		2
Membranes and transport		3	
	Case study – MDR transporter		2
Cell structure / function		4	
Energetics: Respiration		3	
	Case study - bioenergetics		1
Energetics: Photosynthesis		2	
DNA structure and function		2	
Replication		1	
	Bacterial transformation with GFP plasmids		2
Transcription and translation		4	
	Case study- hemoglobin mutations		2
Chromosomes and cell division		3	
	Karyotyping – chromosomal abnormalities		1
Mendelian genetics		6	
	Mendelian inheritance in corn		1
Genomics		2	
	Bioinformatics computer lab		2
Gene regulation - operons		3	
Exams		3	
Totals		45	15

*Library skills, specific to biology, will be incorporated into selected labs.

*These lab topics may change to reflect new technologies and new pedagogy.

VI. Textbook and /or Other Required Materials:

- A. Textbook:
Campbell NA, Reece JB. Biology. 7th Ed. San Francisco: Benjamin-Cummings, 2005.

VII. Basis for student evaluation:

The weight of evaluation criteria may vary at the discretion of the instructor and will be indicated at the beginning of each semester.

- A. Examinations
B. Homework and quizzes
C. Lab/Case study reports