

Instructor: Dr. Sara Fenske

Course: Biology

Academic Year: 2009-2010

Course Philosophy: Biology is the study of life. It is the study of how organisms (such as ourselves) develop, function, and reproduce. As you will find, this is an incredibly complex and fascinating science. In this course you will learn the concepts and techniques of modern biology. Hopefully, through this course, you will come to appreciate, perhaps even love, this incredible science. The success of this course depends on your enthusiasm, hard work, and participation.

Course Requirements:

- 1) Essential Biology with Physiology 2nd edition by Campbell, Reece, and Simon
- 2) Essential Biology with Physiology Study Guide
- 2) Binder for Handouts and paper for notes
- 3) Pencil or Pen (blue or black)
- 4) All handouts
- 5) Netbooks and access to the internet

Grading Procedure: Grades are based on a combination of major exams, tests, quizzes, and writing assignments (including lab reports). Tests will be worth twice as much as quizzes and lab reports. As stated in the Student Handbook, "To emphasize the importance of growth through the school year, the weight of each trimester grade has been changed. The first trimester will count as 15%, the second as 25%, the third as 35%, the mid-year exam as 10%, and the final exam as 15%."

Grading Scale: As stated in the Student Handbook, letter grades are determined based on the following scale:

A- to A+: 90-100

D- to D+: 60-69

B- to B+: 80-89

F: 0-59

C- to C+: 70-79

Homework/ Classwork Policies:

1. All assignments must be completed by the assigned date. Any long-term projects should be worked on daily so that the task is completed on time and will earn the best grade.
1. Two major exams will be given, one mid-year, and one at the end of the year. Both will be cumulative.
2. All assignments should be turned in on the due date during the class period. The maximum score for any late assignments will decrease by 10% for every day late until the grade reaches a maximum score of 50%. Any work not turned in will receive a 0.
3. All work must be legibly written or typed, and grammatically correct.

4. Keep all handouts, homework, returned homework and exams in a binder.
5. Ask questions about any instructions that are not clear.

Classroom Policies:

1. Daily, *prepared* attendance is mandatory. The school's attendance policy will be strictly enforced.
2. You are solely responsible for any material covered or announcements made during your absence.
3. You are expected to treat everyone with respect at all times.
4. Cheating or plagiarism will result in a 0 grade for that assessment and may require you to appear before the honor code committee.
5. During all labs, safety comes first! To ensure that you understand what safe laboratory conduct is, you will be asked to sign a lab safety contract.
6. Finally, you are expected to ask questions about any material that is not clear. Do not worry about a question being too simple. If you don't understand, chances are others don't also (Yes, this is really true).

Tentative Schedule:

Week	Topics	Chapters
1	Overview of Biology & Biological Techniques Review: Water & Chemistry of Life	Ch. 1 & 2
2	Molecules of Cells: Carbohydrates, Lipids, Proteins, and Nucleic Acids	Ch. 3
3	Prokaryotic & Eukaryotic cells: Membranes & Subcellular organization	Ch. 4
4	Free energy changes, Coupled reactions	Ch. 5
5	Enzymes	Ch. 5
6	Cellular Respiration and Fermentation	Ch. 6
7	Cellular Respiration and Fermentation	Ch. 6
8	Photosynthesis	Ch. 7

9	Photosynthesis	Ch. 7
10	Cell Cycle and Mitosis	Ch. 8
11	Meiosis & Gametogenesis	Ch. 8
12	Structure and Function of DNA, Replication of DNA	Ch. 10
13	Thanksgiving Break	
14	Central Dogma: Transcription and Translation & Microbial Genetics	Ch. 10
15	Inheritance Patterns	Ch. 9
16	Inheritance Patterns	Ch. 9
17-18	Christmas Break	
19	Gene Regulation	Ch. 11
20	DNA Technology and Genomics	Ch. 12
21	Population Evolution	Ch. 13
22	Evolution of Biological Diversity	Ch. 14
23	Review/ Mid-Year Exam	
24	Evolution of Microbial Life	Ch. 15

25	Evolution of Plants and Fungi	Ch. 16
26	Evolution of Animals	Ch. 17
27	Unifying Concepts of Animal Structure and Function	Ch. 21
28	Nutrition and Digestion	Ch. 22
29-30	Spring Break	
31	Circulation and Respiration	Ch. 23
32	The Body's Defenses	Ch. 24
33	Hormones	Ch. 25
34	Reproduction and Development	Ch. 26
35	Nervous, Sensory, and Motor Systems	Ch. 27
36	Flowering Plants	Ch. 28
37	Plant Nutrition and Transport and Control Systems in Plants	Ch. 29
38	Review for Final	
39	Final Exam Week	

Biology Outline:

- I. Overview of Biology
- II. The Chemistry of Life
 - i. Elements, Atoms, and Molecules
 - ii. Properties of Water
 - iii. Chemical Reactions
- III. Molecules of Cells
 - i. Introduction to Organic Compounds
 - ii. Carbohydrates
 - iii. Lipids
 - iv. Proteins
 - v. Nucleic Acids
- IV. Eukaryotic and Prokaryotic Cells
 - i. Introduction to the Cell
 - ii. Nucleus and Ribosomes
 - iii. Endomembrane System
 - iv. Chloroplasts and Mitochondria
 - v. Cytoskeleton
 - vi. Membrane Function
- V. Free Energy Changes, Coupled Reactions and Enzymes
 - i. Energy and the Cell
 - ii. Enzyme Function
- VI. Cellular Respiration and Fermentation
 - i. Introduction to Cellular Respiration
 - ii. Stages of Cellular Respiration and Fermentation
 1. Glycolysis
 2. Citric Acid Cycle
 3. Fermentation
- VII. Photosynthesis
 - i. The Light Reactions
 - ii. The Calvin Cycle

- VIII. Cell Cycle, Meiosis, and Gametogenesis
 - i. Cell Division
 - ii. Eukaryotic Cell Cycle and Mitosis
 - iii. Meiosis and Crossing Over
 - iv. Alterations in Chromosome Number and Structure
- IX. Structure and Function of DNA
 - i. Structure of Genetic Material
 - 1. DNA
 - 2. RNA
 - ii. DNA Replication
 - iii. Central Dogma
 - 1. Transcription
 - 2. Translation
 - 3. Mutation
 - iv. Viral Genetics
- X. Patterns of Inheritance
 - i. Mendelian Genetics
 - ii. Variations on Mendel's Laws
 - iii. The Chromosomal Basis of Inheritance
 - iv. Sex Chromosomes and Sex-Linked Genes
- XI. Gene Regulation
 - i. Control of Gene Expression
 - 1. Effects of Gene Regulation
 - 2. Transcriptional Control
 - 3. RNA processing
 - 4. Translational Control
 - ii. Cloning of Plants and Animals
 - iii. Genetic Basis of Cancer
- XII. DNA Technology and Genomics
 - i. Recombinant DNA Technology
 - ii. DNA Fingerprinting and Forensic Science

- iii. Genomics and Proteomics
- iv. Gene Therapy
- XIII. Population Evolution
 - i. Darwin's Theory of Evolution
 - ii. Evidence of Evolution
 - iii. Natural Selection
 - iv. Darwinism and Genetics
 - v. Mechanisms of Microevolution
- XIV. Evolution of Biological Diversity
 - i. Origin of Species
 - ii. Biological Diversity
 - iii. Early Earth and Macroevolution
 - iv. Classifying Life
- XV. Evolution of Microbial Life
 - i. Origin of Life
 - ii. Prokaryotes
 - iii. Protists
- XVI. Evolution of Plants and Fungi
 - i. Plant Evolution and Diversity
 - ii. Fungi
- XVII. Evolution of Animals
 - i. Animal Evolution and Diversity
 - ii. Invertebrate Diversity
 - iii. Vertebrate Evolution and diversity
 - iv. Human Ancestry
- XVIII. Unifying Concepts of Animal Structure and Function
 - i. Structural Organization in Animals
 - 1. Structure and Function
 - 2. Types of Tissues
 - ii. Exchanges with the External Environment
 - iii. Regulating the Internal Environment

- XIX. Nutrition and Digestion
 - i. Animal Nutrition
 - ii. Human Digestive System
 - iii. Nutrition Requirements and Disorders
- XX. Circulation and Respiration
 - i. Animal Circulation
 - ii. Human Cardiovascular System
 - iii. Unifying Concepts of Animal Respiration
 - iv. Human Respiratory System
- XXI. Immune System
 - i. Nonspecific Defenses
 - ii. Specific Defenses
 - iii. Disorders of the Immune System
- XXII. Hormones
 - i. Chemical Regulation
 - ii. Human Endocrine System
- XXIII. Reproduction and Embryonic Development
 - i. Unifying Concepts of Animal Reproduction
 - ii. Human Reproduction
 - iii. Reproductive Health
 - iv. Human Development
 - v. Reproductive Technologies
- XXIV. Nervous, Sensory, and Motor Systems
 - i. Overview of Animal Nervous Systems
 - ii. Human Nervous System
 - iii. The Senses
 - iv. Motor Systems
- XXV. The Flowering Plant
 - i. Plant Structure and Function
 - ii. Plant Growth
 - iii. Reproduction of Flowering Plants

XXVI. Plant Nutrition and Transport

- i. Structure and Function of a Flowering Plant
- ii. Plant Growth
- iii. Life Cycle of a Flowering Plant

XXVII. Plant Nutrition and transport and Control Systems in Plants

- i. Acquisition and Transport of Nutrients
- ii. Plant Hormones
- iii. Response to Stimuli