

Instructor: Dr. Sara Fenske **Course:** Honors Biology

Academic Year: 2008-2009

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. The goal of this course is to prepare you to take the SAT II Biology M Test. Hopefully, it will also instill in you an appreciation, perhaps even a love, of this incredible science. The success of this course depends on your enthusiasm, hard work, and participation.

Course Requirements: 1) Biology Concepts & Connections
6th edition by
Campbell, Reece, Taylor, Simon, and Dickey

- 2) Binder for Handouts and paper for notes
- 3) Pencil or Pen (blue or black)
- 4) All handouts
- 5) Access to the Internet

Grading Procedure: Grades are based on a combination of one Major Exam (at least 100 points), Tests and Quizzes (at least 25 points each), and Writing Assignments (including lab reports) (25-100 points).

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. Problem sets, research papers, and reading 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.
2. One major exam will be given in the first trimester, which will be cumulative. Quizzes will be given every week to two weeks. At least one test will be given per trimester in addition to the major exam and quizzes. Pop quizzes may be given at any time.
3. 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.

4. All work must be legibly written or typed, and grammatically correct.
5. Keep all handouts, homework, returned homework and exams in a binder.
6. 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.
5. During all labs, safety comes first!
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).

Everyone in this course is required to take the SAT II Biology Exam. Because you will be taking this exam, there will be no cumulative final exam.

Tentative Schedule:

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

6	Photosynthesis	Ch. 7
7	Cell Cycle, Meiosis & Gametogenesis	Ch. 8
8	Molecular Biology of the Gene: Structure and Replication of Genetic Material	Ch. 10
9	Central Dogma: Transcription and Translation & Microbial Genetics	Ch. 10
10	Inheritance Patterns	Ch. 9
11	Gene Regulation	Ch. 11
12	Review / Exam Week	
13	DNA Technology and Genomics	Ch. 12
	Thanksgiving Break	
14	DNA Technology and Genomics	4. Ch. 12
15	Population Evolution	Ch. 13
16	Origin of Species and Tracing Evolutionary History	Ch. 14 & Ch. 15
	Christmas Break	
17	Evolution of Microbial Life	Ch. 16
18	Evolution of Plants and Fungi	Ch. 17
19	Evolution of Invertebrate Diversity	Ch. 18
20	Evolution of Vertebrate Diversity	Ch. 19
21	Unifying Concepts of Animal Structure and Function, Nutrition and Digestion, & Gas Exchange	Ch. 20, Ch. 21, & Ch. 22

22	Circulation, The Immune System, & Control of Temperature and Water Balance	Ch. 23, Ch. 24, & Ch. 25
23	The Endocrine System, Reproduction and Embryonic Development	Ch. 26 & Ch. 27
24	Nervous, Sensory, and Motor Systems	Ch. 28, Ch. 29, & Ch. 30
25	Plant Structure, Reproduction, and Development, Plant Nutrition and Transport	Ch. 31 & Ch. 32
26	Control Systems in Plants	Ch. 33
27	The Biosphere & Behavioral Adaptations to the Environment	Ch. 34 & Ch. 35
	Spring Break	
28	Population Ecology, Communities and Ecosystems & Conservation Biology	Ch. 36, Ch. 37, & Ch. 38
29	Review for SAT 2	
30	Review for SAT 2	
31	Review for SAT 2	
32	Review for SAT 2	
33	Current Events in Biology	
34	Current Events in Biology	
35	Final Exam Week	

Honors 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. Cell Structure Involved in Manufacturing and Breakdown
 - iii. Energy-Converting Organelles
 - iv. Internal and External Support: Cytoskeleton and Cell Surfaces
 - v. Membrane Structure and Function
- V. Free Energy Changes, Coupled Reactions and Enzymes
 - i. Energy and the Cell
 - ii. How Enzymes 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
 - iii. Interconnections between Molecular Breakdown and Synthesis

- 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. Molecular Biology of the Gene
 - i. Structure of Genetic Material
 - 1. DNA
 - 2. RNA
 - ii. DNA Replication
 - iii. Central Dogma
 - 1. Transcription
 - 2. Translation
 - 3. Mutation
 - iv. Microbial 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. Gene Cloning
 - ii. Genetically Modified Organisms
 - iii. DNA Profiling

- iv. Genomics
- XIII. Population Evolution
 - i. Darwin's Theory of Evolution
 - ii. Evolution of Populations
 - iii. Mechanisms of Microevolution
- XIV. Origin of Species & History of Evolution
 - i. Concepts of Species
 - ii. Mechanisms of Speciation
 - iii. Early Earth
 - iv. Major Events in the History of Life
 - v. Mechanisms of Macroevolution
 - vi. Phylogeny
- XV. Evolution of Microbial Life
 - i. Prokaryotes
 - ii. Protists
- XVI. Evolution of Plants and Fungi
 - i. Plant Evolution and Diversity
 - ii. Alternations of Generations and Plant Life Cycles
 - iii. Fungi
- XVII. Evolution of Invertebrate Diversity
 - i. Animal Evolution and Diversity
 - ii. Invertebrate Diversity
- XVIII. Evolution of Vertebrate Diversity
 - i. Vertebrate Evolution and diversity
 - ii. Primate Diversity
 - iii. Hominid Evolution

- XIX. Unifying Concepts of Animal Structure and Function
 - i. Hierarchy of Structural Organization in Animals
 - 1. Structure and Function
 - 2. Types of Tissues
 - ii. Exchanges with the External Environment
- XX. Nutrition and Digestion
 - i. Obtaining and Processing Food
 - ii. Human Digestive System
 - iii. Nutrition
- XXI. Gas Exchange
 - i. Mechanisms of Gas Exchange
 - ii. Transport of Gases in the Human Body
- XXII. Circulation
 - i. Mechanisms of Internal Transport
 - ii. Human Cardiovascular System
 - iii. Structure and Function of Blood
- XXIII. Immune System
 - i. Innate Immunity
 - ii. Adaptive/ Acquired Immunity
 - iii. Disorders of the Immune System
- XXIV. Control of Body Temperature and Water Balance
 - i. Thermoregulation
 - ii. Osmoregulation and Excretion
- XXV. Hormones and the Endocrine System
 - i. Chemical Regulation
 - ii. Vertebrate Endocrine System
 - iii. Hormones and Homeostasis
- XXVI. Reproduction and Embryonic Development
 - i. Asexual and Sexual Reproduction
 - ii. Human Reproduction
 - iii. Principles of Embryonic Development
 - iv. Human Development
- XXVII. Nervous System
 - i. Nervous System Structure and Function
 - ii. Nerve Signals and Their Transmission

- iii. Overview of Animal Nervous Systems
- iv. Human Brain
- XXVIII. The Senses
 - i. Sensory Reception
 - ii. Hearing and Balance
 - iii. Vision
 - iv. Taste and Smell
- XXIX. Movement
 - i. Movement and Locomotion
 - ii. Skeletal Support
 - iii. Muscle Contraction and Movement
- XXX. Plant Structure, Reproduction, and Development
 - i. Plant Structure and Function
 - ii. Plant Growth
 - iii. Reproduction of Flowering Plants
- XXXI. Plant Nutrition and Transport
 - i. The Uptake and Transport of Plant Nutrients
 - ii. Plant Nutrients and the Soil
 - iii. Plant Nutrition and Symbiosis
- XXXII. Control Systems in Plants
 - i. Plant Hormones
 - ii. Growth Responses and Biological Rhythms in Plants
 - iii. Plant Defenses
- XXXIII. The Biosphere
 - i. Aquatic Biomes
 - ii. Terrestrial Biomes

- XXXIV. Behavioral Adaptations to the Environment
 - i. Study of Behavior
 - ii. Learning
 - iii. Survival and Reproductive Success
 - iv. Social Behavior and Sociobiology
- XXXV. Population Ecology
 - i. Population Structure and Dynamics
 - ii. Human Population
- XXXVI. Communities and Ecosystems
 - i. Community Structure and Dynamics
 - ii. Ecosystem Structure and Dynamics
- XXXVII. Conservation Biology
 - i. The Biodiversity Crisis
 - ii. Conservation Biology and Restoration Ecology