

## Biology

Text:	<u>Modern Biology</u> , John H. Postlethwait and Janet L. Hopson (2006); Holt, Rinehart and Winston.
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Supplemental Materials:	Videos and laboratory manuals.
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Course Description:	Biology is a year long course that describes the characteristics of living things. The class covers the basic biological concepts and uses a taxonomic approach to study living organisms. Life will be studied from the simplest organisms to the most complex. Biology has a strong lab component.
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Methods of Evaluation:	Evaluation is based on tests, labs, periodic quizzes and homework assignments.
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Course Objectives:	<p>At the end of each of the following chapters, students should be able to:</p> <p><u>Chapter 1.</u></p> <ol style="list-style-type: none"><li>1. Describe the characteristics of living things.</li><li>2. Discuss the hierarchy of organization within complex multi-cellular organisms.</li><li>3. List and discuss the steps in the scientific method.</li><li>4. Describe several tools used by biologists, with special emphasis on the microscope.</li></ol> <p><u>Chapter 4/5.</u></p> <ol style="list-style-type: none"><li>1. Identify the scientists that made major contributions to cell biology and the cell theory.</li><li>2. Describe the parts and functions of animal and plant cells.</li><li>3. Distinguish between diffusion and osmosis.</li><li>4. Compare and contrast active transport and passive transport.</li><li>5. Discuss the factors that affect the direction of osmosis.</li></ol> <p><u>Chapter 6/7.</u></p> <ol style="list-style-type: none"><li>1. Discuss the steps in photosynthesis.</li><li>2. Explain the role of photosynthetic pigments.</li><li>3. Discuss the alternative pathways some plants use to make food.</li><li>4. Discuss the steps in cellular respiration.</li><li>5. Calculate the efficiency of anaerobic and aerobic respiration.</li><li>6. Discuss how photosynthesis and cellular respiration are said to be in balance.</li></ol> <p><u>Chapter 8.</u></p> <ol style="list-style-type: none"><li>1. Distinguish between haploid and diploid cells, and explain why each has a different chromosome number.</li><li>2. Describe the events that occur during cell division.</li><li>3. Compare and contrast mitosis and meiosis.</li></ol>
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<p>Course Objectives (Cont.):</p>	<p><u>Chapter 9.</u></p> <ol style="list-style-type: none"> <li>1. Describe Mendel's genetics experiments and relate his experiments to scientific knowledge of genes and chromosomes.</li> <li>2. State Mendel's laws of heredity.</li> <li>3. Discuss the differences between genotype and phenotype.</li> <li>4. Use a Punnett square to predict probability</li> <li>5. Differentiate between a monohybrid cross and a dihybrid cross.</li> </ol> <p><u>Chapter 10.</u></p> <ol style="list-style-type: none"> <li>1. Compare and contrast the structure and function of DNA and RNA.</li> <li>2. Describe the processes of replication, transcription and translation.</li> <li>3. Define genetic code and discuss its role in protein synthesis.</li> </ol> <p><u>Chapter 17.</u></p> <ol style="list-style-type: none"> <li>1. Discuss the relationship between biodiversity and biological classification.</li> <li>2. Describe the levels of modern classification from general to specific.</li> <li>3. List the characteristics of the six kingdoms used in modern taxonomy.</li> </ol> <p><u>Chapter 23/24.</u></p> <ol style="list-style-type: none"> <li>1. Define prokaryote and explain the phylogenetic relationship between Archaea and Bacteria.</li> <li>2. Describe the common methods used to identify and classify bacteria.</li> <li>3. Describe how bacteria can cause diseases in humans and how bacteria have beneficial uses.</li> <li>4. Describe the basic structure of viruses.</li> <li>5. Compare and contrast the lytic and lysogenic cycles of a virus.</li> <li>6. Discuss several viral diseases and their vectors.</li> <li>7. Compare and contrast viroids, prions and viruses.</li> </ol> <p><u>Chapter 25.</u></p> <ol style="list-style-type: none"> <li>1. Describe the two major ways that protists obtain energy.</li> <li>2. Discuss the origin of the eukaryotic cell.</li> <li>3. Describe the characteristics of the different phyla of protozoans.</li> <li>4. Describe the characteristics of the different phyla of algae.</li> <li>5. Discuss how protists affect humans and the environment.</li> </ol> <p><u>Chapter 26 →30.</u></p> <ol style="list-style-type: none"> <li>1. Describe the characteristics of the three phyla of fungi.</li> <li>2. Discuss the environmental importance of lichens and mycorrhizae.</li> <li>3. Discuss how fungi affect humans and the environment.</li> <li>4. Describe the classification of plants.</li> <li>5. Compare and contrast non-vascular plants and vascular plants.</li> <li>6. Compare and contrast angiosperms and gymnosperms.</li> </ol>
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<p>Course Objectives (Cont.):</p>	<ol style="list-style-type: none"> <li>7. Describe the structure and functions of stems, leaves, roots and flowers.</li> <li>8. Describe the three mechanisms responsible for water transport within plants.</li> <li>9. Describe pollination, fertilization and germination in plants.</li> <li>10. Describe several methods of artificial vegetative propagation.</li> </ol> <p><u>Chapter 32/33.</u></p> <ol style="list-style-type: none"> <li>1. Identify the four important characteristics of animals.</li> <li>2. Identify the four characteristics of the chordates.</li> <li>3. Describe the types of symmetry used to classify animals.</li> <li>4. Compare and contrast vertebrates and invertebrates.</li> <li>5. Describe the anatomy and physiology of the sponges and the stinging animals.</li> </ol> <p><u>Chapter 34/35.</u></p> <ol style="list-style-type: none"> <li>1. Describe the anatomy and physiology of the flatworms, roundworms and segmented worms.</li> <li>2. Compare and contrast free-living worms and parasitic worms.</li> <li>3. Describe the life cycles of several parasitic worms.</li> <li>4. Describe the characteristics of the major classes of mollusks.</li> </ol> <p><u>Chapter 36.</u></p> <ol style="list-style-type: none"> <li>1. Describe the characteristics of the five major subphyla of arthropods.</li> <li>2. Explain the advantages and disadvantages of molting in arthropods.</li> <li>3. Describe the internal and external anatomy of a crayfish.</li> </ol> <p><u>Chapter 37.</u></p> <ol style="list-style-type: none"> <li>1. Discuss why insects have become the most successful organisms on Earth.</li> <li>2. Describe the harmful and beneficial effects of insects on humans.</li> <li>3. Describe the internal and external anatomy of a grasshopper.</li> <li>4. Compare and contrast incomplete metamorphosis and complete metamorphosis.</li> <li>5. Identify three ways insects communicate with each other.</li> <li>6. Describe the social organization of honeybees.</li> </ol> <p><u>Chapter 38.</u></p> <ol style="list-style-type: none"> <li>1. Describe the distinguishing characteristics of the five classes of echinoderms.</li> <li>2. Discuss the water-vascular system in echinoderms.</li> <li>3. Describe the structure of the non-vertebrate chordates.</li> </ol> <p><u>Chapter 39.</u></p> <ol style="list-style-type: none"> <li>1. Describe the distinguishing characteristics of the vertebrates and give an example of each of the nine classes of vertebrates.</li> <li>2. Compare and contrast the three classes of fish.</li> <li>3. Describe the characteristics that make the bony fish so successful.</li> <li>4. Describe the internal and external anatomy of a cartilaginous fish and a bony fish.</li> </ol>
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<p>Course Objectives (Cont.):</p>	<p><u>Chapter 40.</u></p> <ol style="list-style-type: none"> <li>1. Discuss three adaptations involved in the transition from aquatic to terrestrial life.</li> <li>2. Describe the characteristics of the three orders of amphibians.</li> <li>3. Describe the internal and external anatomy of a frog.</li> </ol> <p><u>Chapter 41.</u></p> <ol style="list-style-type: none"> <li>1. Describe the characteristics of reptiles that make them well adapted to life on land.</li> <li>2. Compare and contrast oviparity, ovoviviparity and viviparity as reproductive strategies.</li> <li>3. Describe the four orders of modern reptiles.</li> </ol> <p><u>Chapter 42.</u></p> <ol style="list-style-type: none"> <li>1. Describe the major characteristics of the birds.</li> <li>2. Describe the structure and function of the different types of feathers.</li> <li>3. Compare and contrast altricial and precocial young.</li> <li>4. Describe the major orders of modern birds.</li> </ol> <p><u>Chapter 43.</u></p> <ol style="list-style-type: none"> <li>1. Describe the major characteristics of the mammals.</li> <li>2. Discuss the differences between monotremes, marsupials and placental mammals.</li> <li>3. Describe the major orders of mammals.</li> <li>4. Describe the internal and external anatomy of a pig.</li> </ol>
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