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Things; 4.1 Prokaryotes and Eukaryotes; 4.2 The Biological Membrane; 4.3 Membrane Transport 4.4 Eukaryotic Cell Structure and Function 4.5 Cell Reproduction; Problems; References; 5 Energy and Metabolism; 5.1 Bioenergetics; 5.1.1 Some Basic Thermodynamics; 5.1.2 Oxidation-Reduction; 5.1.3 Phosphate Compounds and ATP; 5.1.4 Reaction Coupling; 5.2 Elementary Kinetics; 5.3 Enzyme Kinetics; 5.3.1 Single-Substrate Kinetics; 5.3.2 Multiple Substrates; 5.3.3 Effect of pH; 5.3.4 Effect of Temperature; 5.3.5 Other Considerations; 5.4 Biochemical Pathways; 5.4.1 Glycolysis; 5.4.2 Fermentation; 5.4.3 Respiration; 5.4.4 Oxidation of Fats and Amino Acids; 5.4.5 Photosynthesis; 5.4.6 Biosynthesis ProblemsReferences; 6 Genetics; 6.1 Heredity; 6.1.1 Mendel's Experiments; 6.1.2 Sex Chromosomes; 6.1.3 Genetic Disease; 6.2 Molecular Biology; 6.2.1 Protein Synthesis; 6.2.2 Gene Regulation; 6.2.3 Mutations; 6.2.4 DNA Repair; 6.3 Genetic Engineering; 6.3.1 DNA Analysis and Probes; 6.3.2 Cloning and Recombinant DNA; 6.3.3 Polymerase Chain Reaction; 6.3.4 Genetic Engineering and Society; 6.4 Genetic Variation; 6.5 Sexual Reproduction; Problems; References; 7 The Plants; 7.1 Plant Divisions; 7.2 Structure and Physiology of Angiosperms; 7.2.1 Water and Nutrient Transport 7.2.2 Plant Growth and Control 7.2.3 Plant Nutrition; Problems; References; 8 The Animals; 8.1 Reproductive Strategies; 8.2 Invertebrate Phyla Other Than Arthropods; 8.3 Mollusks, Segmented Worms, Arthropods; 8.3.1 Mollusks; 8.3.2 Annelids; 8.3.3 Arthropods; 8.3.4 Lesser Protostomes; 8.4 Deuterostomes (Starfish, Vertebrates, etc.); 8.4.1 Echinoderms; 8.4.2 Chordates, Including the Vertebrates; Problems; Reference; 9 The Human Animal; 9.1 Skin; 9.2 Skeletal System; 9.3 Muscular System; 9.4 Nervous System; 9.4.1 Nerve Signal Transmission; 9.4.2 Synaptic Transmission 9.4.3 Nervous System Organization

Sommario/riassunto

The growth of the environmental sciences has greatly expanded the scope of biological disciplines today's engineers have to deal with. Yet, despite its fundamental importance, the full breadth of biology has been given short shrift in most environmental engineering and science courses. Filling this gap in the professional literature, Environmental Biology for Engineers and Scientists introduces students of chemistry, physics, geology, and environmental engineering to a broad range of biological concepts they may not otherwise be exposed to in their training. Based on a graduate-level co