A.P. BIOLOGY: 2009-2010 COURSE SYLLABUS

Textbook: Campbell and Reece. *Biology*. San Francisco: Benjamin Cummings, Inc., 7th Edition.
Lab Manual: *Advanced Placement Biology Laboratory Manual*.
Other Sources: *Scientific American* magazine

Unit	**Chapter**	**Topics**	**Laboratory: 3 double periods (80mins)/week**
Course Introduction	1	A View of Life Review Eight Themes in the Study of Life	Lab: Scientific Method and Measurement Lab: A.P. Lab #11 Animal Behavior
Molecules and Cells	2 3 4 5 6	Atomic structure Elements, compounds and molecules The Chemistry of Water The Chemistry of Organic Molecules Organic Molecules Carbohydrates Lipids Proteins Nucleic Acids Metabolism: Energy and Enzymes Metabolic reactions and energy transformations Metabolic pathways and enzymes Oxidation-reduction	Lab: Protein Comparison Lab: A. P. Lab #2 Enzyme Catalysis Scientific American Articles: "The Promise of Molecular Imprinting"; October 2006 by Klaus Mubach Molecular Lego": February 2007 by Christian E. Shafmeister Scientific American Article: "The Long Arm of the Second Law"; November 2008 by J. Miguel Rubi "A New Kind Of Drug Target": August 2009 by Melissa Wenner
Molecules and Cells	7 8 9 10 	Cell Structure and Function Prokaryotic cells Eukaryotic cells Membrane Structure and Function Membrane models Membrane structure and function Permeability of the plasma membrane Modification of cell surfaces Cellular Respiration Glycolysis Fermentation Chemiosmosis Photosynthesis Structure and function of chloroplasts Light Reactions and the Calvin Cycle Other types of Photosynthesis	Lab: Basic Microscopy Lab: A. P. Lab #1 Diffusion and Osmosis Lab: Fermentation Lab: A.P. Lab #5 Cell Respiration Lab: Use of the Spec-20 Lab: A.P. Lab #4 Plant Pigments and Photosynthesis Article: "Methane, Plants and Climate Change"; February 2007; Scientific American; by Frank Keppler and Thomas Röckmann

Heredity	12 13 14 15 16 17 18/19 20 	The Cell Cycle and Cellular Reproduction How prokaryotic cells divide How eukaryotic cells divide How eukaryotic cells cycle Cancer Meiosis and Sexual Reproduction The phases of meiosis Comparison of mitosis and meiosis The human life cycle Mendelian Patterns of Inheritance Gregor Mendel Monohybrid inheritance Dihybrid inheritance Human Genetic Disorders Beyond Mendelian Genetics Chromosomal Patterns of Inheritance Chromosomal Inheritance Gene Linkage Changes in Chromosome Number Changes in Chromosome Structure DNA Structure and Functions The genetic material The structure of DNA Replication of DNA Gene Activity: How Genes Work The function of genes The genetic code Regulation of Gene Activity and Gene MutationsProkaryotic regulation Eukaryotic regulation Genetic mutations Biotechnology and Genomics Gene cloning Biotechnology products The human genome project Gene therapy	Lab: A. P. Lab #3 Mitosis Lab: A. P. Lab #3 Meiosis Lab: A.P. Lab #7 Genetics of Organisms Lab: A.P. Lab #6: Molecular Biology Article: “Chromosomal Chaos and Cancer”; May 2007; Scientific American by Peter Duesberg WebQuest: Stem Cells Learn.Genetics. The University of Utah, Genetic Science Learning Center. <http://learn.genetics.utah.edu/>. Article: “Owning the Stuff of Life”; February 2006; Scientific American; by Gary Stix;
Evolution	22 23/24 	Darwin and Evolution History of the theory of evolution Darwin’s theory of evolution Evidence for evolution Process of Evolution Evolution in genetic context Natural selection Speciation	Lab: A. P. Lab #8: Population Genetics and Evolution Lab: Constructing Phylogenies Article: “Climate and the Evolution of Mountains”; August 2006; Scientific American; by Kip Hodges **(continuity and change)**

	25 26	Classification of Living Things Taxonomy Phylogenetic Trees Systematics Today Classification Systems Origin and History of Life Origin of life History of life Factors that influence evolution	
Organisms and Populations	27 28 31	Bacteria, and Archaea Viruses The Prokaryotes The Bacteria The Archaea The Protists General biology of the protists Diversity of protists The Fungi Characteristics of fungi Classification of fungi Symbiotic relationships of fungi	Lab: Phagehunting
Organisms and Populations	29 30 36/37 38 39	Evolution and Diversity of Plants Evolutionary history of plants Nonvascular plants Ferns and allies Gymnosperms Angiosperms Structure and Organization of Plants Plant tissues and organs Monocot vs. dicot plants Organization of roots, stems, and leaves Nutrition and Transport in Plants Plant nutrition and soil Water and mineral uptake Transport mechanisms in plants Reproduction in Plants Reproductive strategies Seed development and fruit types Asexual reproduction in plants Control of Growth & Responses in Plants Plant responses Plant hormones Photoperiodism	Lab: A.P. Lab #9: Transpiration

Organisms and Populations	32 33 34 35	Introduction to Invertebrates Evolution of animals Multicellularity True tissue layers Bilateral symmetry Tube-within-a-tube The Protostomes Advantages of the coelom Molluscs to Arthropods The Deuterostomes Echinoderms to Chordates Vertebrates Human Evolution Evolution of primates Evolution of hominids Evolution of modern humans	
Organisms and Populations	40 41 42 43 44 45	Animal Organization and Homeostasis Types of tissues Organs and organ systems Homeostasis Digestion and Nutrition Digestive tracts Human digestive tract & Nutrition Circulation Transport in animals Transport in humans Cardiovascular disorders Blood Respiration Gas exchange surfaces Human respiratory system Respiration and health Lymph Transport and Immunity Lymphatic system Specific and nonspecific defense Induced immunity Immunity side effects Body Fluid Regulation and Excretion Body fluid regulation Nitrogenous waste products Organs of excretion Urinary system in humans Hormones and Endocrine Systems Chemical signals The human endocrine system	Lab: Animal Tissues Lab#10: Physiology of the Circulatory System Article: “The Parasitic Wasp’s Secret Weapon”: November, 1997; Scientific American by Nancy Beckage

	46 47 48 49 	Reproduction How animals reproduce Male reproductive system Female reproductive system Development Early developmental stages Developmental processes Human embryonic and fetal development Neurons and Nervous Systems Evolution of the nervous system Nervous tissue Central nervous system Peripheral nervous system Sense Organs Chemical senses Sense of vision Sense of hearing and balance Support Systems and Locomotion Diversity of skeletons The human skeletal system The human muscular system	
Ecology	50 51 52 53 54 	Ecology as Science Abiotic and biotic factors Climate and the biosphere Terrestrial and aquatic biomes Behavioral Biology Animal societies Population Ecology Characteristics of populations Regulation of population size Life history patterns Concepts of the community Structure of the community Community development Community biodiversity Ecosystems and Human Interferences flow and nutrient cycling Aquatic Primary Productivity The nature of ecosystems Global biogeochemical cycles	Lab: A.P. Lab #12 Dissolved O_2 and Energy Article: "Environmental and Economic Costs of Nonindigenous Species in the United States" January 2000, <u>Bioscience:</u> David Pimentel, Lori Lach, Rodolfo Zuniga, and Doug Morrison Discussion: What is the impact of invasive species on Lake Erie? What are possible methods of control? **(interdependence in nature)**