AP Class (Grade 9-12)

AP404 - AP Biology

Key Exam Details

- Chemistry of Life: 8%- 11%
- Cell Structure and Function: 10%- 13%
- Cellular Energetics: 12%- 16% ca
- Cell Communication and Cell Cycle: 10%- 15%
- Heredity: 8%- 11%
- Gene Expression and Regulation; 12%- 16%
- Natural Selection: 13%-20%
- Ecology: 10%- 15%

Session 1 & 2: 32 classes

Unit/Topic	Description	Date	Status
Unit 1: Basic Chemistry Structure of water and hydrogen bonding Elements of life	**Basics of AP Biology Exam** ● Exam structure ● Study guides ● Test scores **Structure of water and hydrogen bonding** Hydrogen bonds in water ● Surface tension ● Capillary action ● Specific heat, heat of vaporization, and density of water **Elements of life** ● Matter, elements, and atoms ● Carbon and hydrocarbons ● Functional groups Review: periodic table	Class Day #1	In progress

Unit 1: Basic Chemistry Biological macromolecules Properties, structure, and function	**Biological macromolecules** ● Ionic and covalent bonds ● Introduction to macromolecules **Properties, structure, and function** ● Molecular structure of DNA/RNA ● Carbohydrates ● Saturated, unsaturated, and trans fats ● Protein structure Review: biological macromolecules	Class Day #2	
Unit 1: Basic Chemistry Nucleic acids	**Nucleic acids** ● DNA ● Antiparallel structure of DNA strands ● Nucleic acids	Class Day #3	
Unit 1: Basic Chemistry	REVIEW DAY	Class Day #4	
Unit 1: Basic Chemistry	**UNIT 1 EXAM**	Class Day #5	
Unit 2: Function Cell structure and function Cell size	**Cell structure and function** ● Introduction to cells and eukaryotic cells ● Endoplasmic reticulum and Golgi bodies ● Endomembrane system ● Mitochondria and chloroplasts **Cell size** ● Scale of cells ● Introduction to cilia, flagella, and pseudopodia ● Surface area to volume ratio of cells	Class Day #6	
Unit 2: Function Plasma membranes Membrane permeability	**Plasma membranes** ● Fluid mosaic model of cell membranes ● Cell membrane proteins ● Review: cell membrane **Membrane permeability** ● Plant cell walls ● Matrix and cell wall ● Cell membrane introduction ● Fluid mosaic model	Class Day #7	

Unit 2: Function Transport and diffusion	**Membrane transport** ● Passive and active transport ● Selective permeability ● Review: passive transport ● Review: active transport ● Endocytosis, phagocytosis, pinocytosis ● Exocytosis **Facilitated diffusion** ● Electrochemical gradients and secondary active transport ● Uniporters, symporters, and antiporters ● Facilitated diffusion ● Sodium potassium pump	Class Day #8	
Unit 2: Function **BONUS:** tonicity and osmoregulation	**Mechanisms of transport: tonicity and osmoregulation** ● Diffusion and osmosis ● Osmosis ● Hypotonic, isotonic, and hypertonic solutions (tonicity) ● Osmosis and tonicity	Class Day #9	
Unit 2: Function Cell compartmentalization and its origins	**Cell compartmentalization and its origins** ● Prokaryotic and eukaryotic cells ● Endomembrane system ● Endosymbiosis theory Review: prokaryotes and eukaryotes	Class Day #10	
Unit 2: Function	REVIEW DAY	Class Day #11	
Unit 2: Function	**UNIT 2 EXAM**	Class Day #12	

Unit 3: Cellular Energetics Enzyme structure and catalysis Cellular energy	**Enzyme structure and catalysis** • Enzymes • Activation energy • Active site • Competitive and noncompetitive inhibition • Enzyme regulation **Cellular energy** • First and second law of thermodynamics • ATP and reaction coupling • Anabolism and catabolism	Class Day #13	
Unit 3: Cellular Energetics Signal transduction Cell cycle	**Signal transduction** • Membrane receptors • Ligands • G protein coupled receptors • Signal relay **Cell cycle** • Interphase • Mitosis • Phases of mitosis	Class Day #14	
	• Phases of cell cycle		
Unit 3: Cellular Energetics Photosynthesis Cellular respiration	**Photosynthesis** • Light-dependent reactions • Calvin cycle Review: photosynthesis **Cellular respiration** • Cellular respiration and redox • Steps of cellular respiration • Oxidative phosphorylation and electron transport chain • Fermentation and anaerobic respiration	Class Day #15	
Unit 3: Cellular Energetics	REVIEW DAY	Class Day #16	
Unit 3: Cellular Energetics	**UNIT 3 EXAM**	Class Day #17	

Unit 4: Environment Meiosis and heredity	**Meiosis and heredity** ● Gametes, zygotes, haploid, diploid ● Phases of meiosis I ● Phases of meiosis II ● Mitosis vs. meiosis	Class Day #18	
Unit 4: Environment Mendelian genetics Non-mendelian genetics	**Mendelian genetics** ● Heredity introduction ● Alleles and genes ● Punnett squares ● Law of segregation ● Law of independent assortment ● Probabilities in genetics **Non-mendelian genetics** ● Mendel's laws ● Chromosomal basis of inheritance (X-linked) ● Genetic linkage and mapping ● Pedigree ● Extranuclear inheritance I	Class Day #19	
Unit 4: Environment Environmental effects on phenotype	**Environmental effects on phenotype** ● Phenotypic plasticity ● Gene environment interaction ● Polygenic inheritance and environmental effects	Class Day #20	
Unit 4: Environment Chromosomal inheritance	**Chromosomal inheritance** ● Boveri-Sutton theory ● Aneuploidy ● Chromosomal basis of inheritance ● Variation in a species	Class Day #21	
Unit 4: Environment DNA and RNA structure Replication	**DNA and RNA structure** ● Molecular structure of DNA and RNA ● Prokaryote structure ● Nucleic acids and nucleotides **Replication** ● Antiparallel structure of DNA strands ● Semi conservative replication Review: DNA structure and replication		
Unit 4: Environment RNA Processing	**RNA processing** ● Transcription ● mRNA processing ● Eukaryotic gene transcription: DNA => mRNA ● Eukaryotic pre-MRNA processing		

Unit 4: Environment Translation Gene Expression	**Translation** • Overview • Retroviruses • Translation differences between prokaryotes and eukaryotes • DNA replication, RNA transcription, translation **Gene expression** • DNA and chromatin regulation • Non-coding RNA • Cellular specialization • Operons: lac operon, trp operon • Gene regulation in bacteria		
Unit 4: Environment Mutations	**Mutations** • Introduction to mutations • Mutagens and carcinogens • Genetic variation in prokaryotes • Evolution of viruses		
Unit 4: Environment **BONUS:** biotechnology	**Biotechnology** • DNA cloning • Polymerase chain reaction • Gel electrophoresis • DNA sequencing		

Unit 4: Environment	REVIEW DAY		
Unit 4: Environment	REVIEW DAY		
Unit 4: Environment	UNIT 4 EXAM		
Unit 4: Environment	REVIEW DAY		
Unit 4: Environment	REVIEW DAY		
Unit 4: Environment	FINAL EXAM PT. 1		
Unit 4: Environment	FINAL EXAM PT. 2		
Unit 4: Environment	End of class games		

Syllabus: https://school.thinkland.ai/syllabus/

Curriculum: https://school.thinkland.ai/curriculum

Teachers: https://school.thinkland.ai/teacher

Email: contact@thinkland.ai; Wechat ID: thinklandai

https://school.thinkland.ai